ROADS AND STREETS

OCTOBER 1946

For Dependable, Low-Cost Power

Specify Adams

★ There's power galore under the hood of an Adams Motor Grader . . . fast-starting power, available at the push of a button . . . flexible, easily-controlled power that handles every grading operation effectively, economically . . . rugged, dependable power that "hangs on" in toughest going, even under heavy overloads.

But power alone in a motor grader is not enough. Great strength and stamina are needed too . . . the very kind you find in Adams' all-welded, machine-finished construction—in the big, husky frames, axles, gears and operating controls. Little wonder that Adams Motor Graders are world-famous for always-dependable, long-life performance.

With all their tremendous power, strength and stamina, Adams Motor Graders are economical to operate and maintain . . . economical in fuel consumption—economical to service and repair. And Adams' world-wide dealer establishments guarantee constant availability of genuine factory parts, plus fast, efficient, reasonably-priced service. Let your local Adams dealer give you the complete story.

J. D. ADAMS MANUFACTURING CO., INDIANAPOLIS, IND.

ADAMS

ROAD BUILDING AND EARTH-MOVING EQUIPMENT

MAGIC CARPET

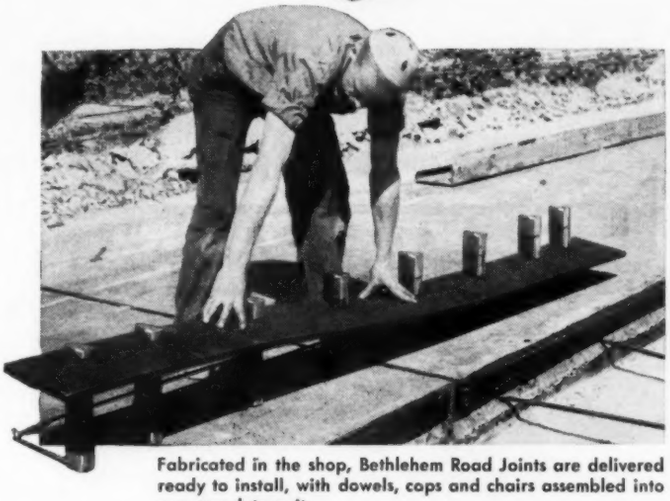
The photograph above was taken during construction of the four-lane Paxtonia-Manadahill, Pa., section of U. S. 22, a modern magic carpet connecting New York City with Cincinnati, Ohio. This stretch of the 665-mile highway was built by Buffalo Gravel Corp., Camp Hill, Pa., under the supervision of Ralph Daniels. Bethlehem road steels were used throughout.

Bethlehem supplies every form of steel needed in the construction of a highway or highway bridge. When you order steel for a highway contract from Bethlehem your order is handled as a unit, with shipment scheduled so that each individual item arrives at the project as it is needed. Costly follow-ups are avoided, and bookkeeping is minimized.

Many contractors make a habit of ordering all their road-steel needs from Bethlehem. Bethlehem Steel service saves them time and money. Next time you need steel for a highway job, or a bridge, put your requirements up to us.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation



Fabricated in the shop, Bethlehem Road Joints are delivered ready to install, with dowels, caps and chairs assembled into one complete unit.

Leading Bethlehem Highway Products

Road Joints • Reinforcing Bars • Bar Mats • Guard Rail • Guard Rail Posts and Brackets • Wire Rope and Strand • Hollow Drill Steel • Fabricated Structural Steel • Sheet and H-Piling • Spikes • Timber Bridge Hardware Bolts and Nuts • Tie Rods

★ BETHLEHEM STEEL **STEEL for HIGHWAYS** ★

ROADS AND STREETS

No. 10 October, 1946 Vol. 89

In this Issue

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; HAROLD J. McKEEVER, Editor; CHARLES T. MURRAY, Managing Editor; H. K. GLIDDEN, Eastern Editor (N. Y.); LT. COL. V. J. BROWN, Publishing Director (Absent on Military Duty); H. J. CONWAY, Advertising Editor; L. R. VICKERS, Promotional Director.

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Just name it...

THE TL-20's GOT IT!

The TL-20 is "new" in more than just name. It's brimming over with features—new, advanced features—in turntable, boom equipment and mountings. Check 'em, then stack up this unit point for point against any other shovel or crane in the ½-yd. class. It's first in the field for modern design, hustle and all around utility.

Ask your local Lorain distributor for a close up, on-the-job inspection of the new TL-20. You will want this new Lorain on your team in the competitive days just ahead.

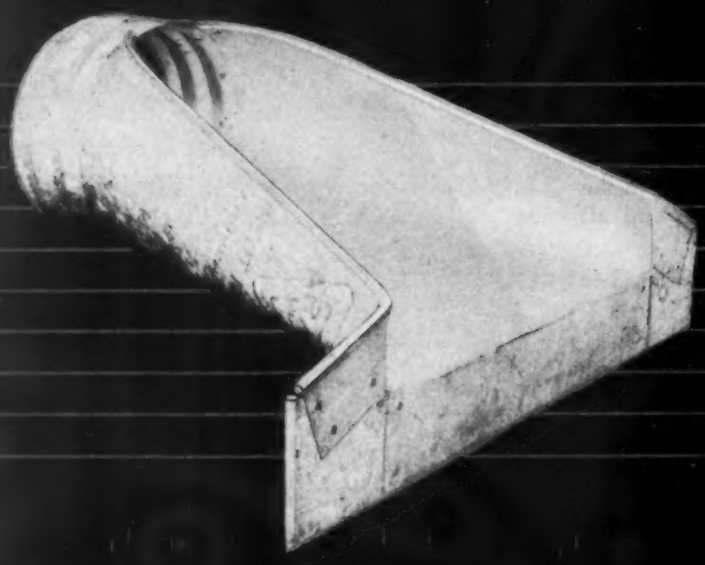
THE THEW SHOVEL COMPANY
Lorain, Ohio

- UNIT ASSEMBLY
- INTERCHANGEABLE PARTS
- 5 IDENTICAL CLUTCHES
- ANTI-FRICTION BEARINGS
- OIL-ENCLOSED CUT GEARS
- ONE-PIECE WELDED BED
- HOOK ROLLERS
- 2-SPEED CRAWLER
- DROP-FORGED TREADS
- POSITIVE TRAVEL LOCK
- "FULL CIRCLE" STEERING
- 9 RUBBER-TIRE MOUNTINGS
- ALL-PURPOSE CRANE BOOM
- POSITIVE INDEPENDENT SHOVEL CROWD
- GOOSENECK HOE BOOM

The **NEW** **Lorain**

Thew **TL 20** *Lorain*

Finish off your culverts



with these NEW END SECTIONS

Here's new end protection for corrugated metal culverts. It meets all requirements for present day road design — provides added safety, economy, efficiency and beauty.

ARMCO End Sections fit the slope to blend perfectly with any landscaping treatment. There are no obstructions above the shoulder grade — an important safety feature — and nothing to interfere with regular maintenance operations such as mowing or snow removal. Tightly banded to the culvert pipe, ARMCO End Sections resist settlement and frost action and withstand transverse pressures. The toe plate can be extended to any depth to prevent undermining and undercutting. On the upstream end the flared design reduces entrance loss — takes more water faster.

ARMCO End Sections are low in cost, require but little excavation and are easily installed with a minimum of unskilled labor. Curing or follow-up operations are not needed. These End Sections will last as long as the culvert and, should conditions change, they can be salvaged for re-use. Write for data. Armco Drainage & Metal Products, Inc., and Associated Companies, 1925 Curtis St., Middletown, Ohio.

ARMCO

Armco

End Sections

You get all 3 — with the model A-D

POWER 75 Diesel horsepower—more than enough for the toughest kind of work. 2-cycle engine efficiency and economy.

TRACTION 21,500 lbs. total weight... with 15,660 lbs. concentrated on the four rear Tandem wheels, that drive together... as a unit!

CLEARANCE 22-inch front axle clearance allows material to flow freely to moldboard—no hanging-up on windrow, no wasting h. p. pushing a dead load.

Plus a full range of blade positions and leaning front wheels to handle all types of grading with ease.

Plus simplified operation—easier steering and control, electric instruments, electric brakes, full operator comfort.

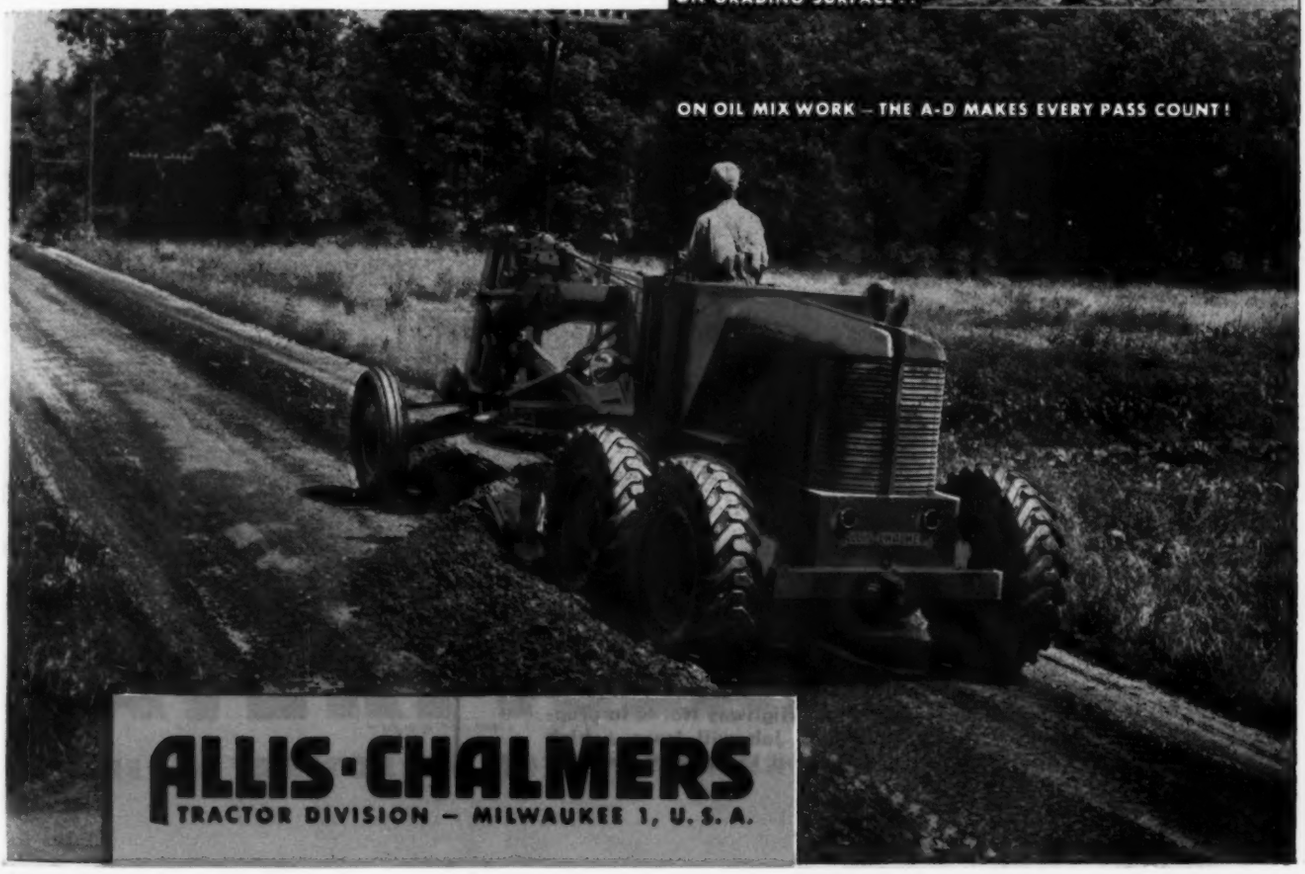
Plus a larger capacity, longer life, easier-to-operate clutch... gears that automatically lock in place... a tubular frame that resists all twists and strains.

Together these Model A-D features mean more work done, more accurately, at lower cost . . . a better job on every job!

ON SLOPING . .

ON DITCHING . .

ON GRADING SURFACE . .



ON OIL MIX WORK — THE A-D MAKES EVERY PASS COUNT!

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

A user writes the

South Dakota's State Highway Dept. uses this "Caterpillar" Diesel No. 12 Motor Grader for year-round road-building and maintenance. Here it is banksloping 10 miles of State Highway No. 40 in preparation for winter. Finished job will leave a high crown and clean ditch to keep snow from drifting.

AD-OF-THE-MONTH

"You simply can't beat the No. 12 Motor Grader for the kind of work we do. It's fast and economical and it really gives the taxpayers a break. After using old, worn-out equipment it certainly is a satisfaction to switch to the No. 12."

E. W. MEEKER
State Highway Engineer
Pierre, S. D.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR DIESEL

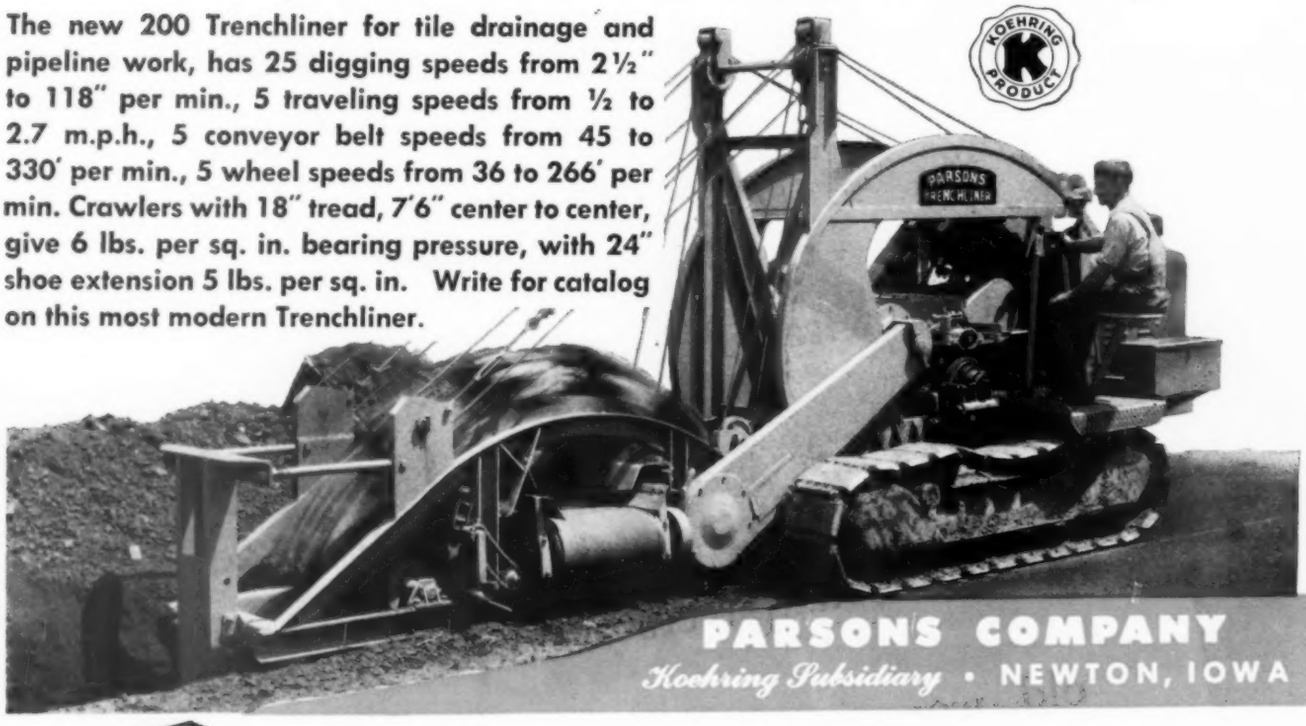
REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Parsons 200 TRENCHLINER

digs 15" to 26" wide, up to 5' 6" deep

The new 200 Trenchliner for tile drainage and pipeline work, has 25 digging speeds from 2½" to 118" per min., 5 traveling speeds from ½ to 2.7 m.p.h., 5 conveyor belt speeds from 45 to 330' per min., 5 wheel speeds from 36 to 266' per min. Crawlers with 18" tread, 7'6" center to center, give 6 lbs. per sq. in. bearing pressure, with 24" shoe extension 5 lbs. per sq. in. Write for catalog on this most modern Trenchliner.



PARSONS COMPANY
Koehring Subsidiary • NEWTON, IOWA

Johnson PORTABLE TWIN SILO

STORES 1,550 BARRELS CEMENT

The largest of the Johnson Twin Silo Bulk Cement Plants stores 1556 barrels of cement. Smaller Johnson Twin Silo Bulk Cement Plants store 708, 990, 1274 barrels. Yet, their large storage capacity does not limit their portability. Disassembled units easily fit flat cars or flat bed trucks. Initial cost of the unit is low, with operating costs at a minimum.

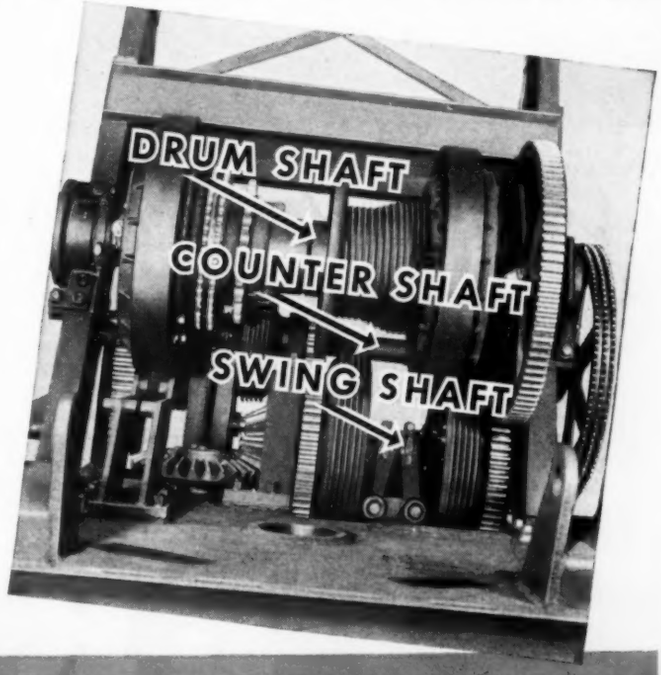
Other Johnson Bulk Cement Plants include the Portable Section Unit (storage capacities: 280 to 500 bbls.), the Dutchmill (storage capacities: 50 to 150 bbls.) and the Elevating Charger, an unloading transfer and batching plant.

THE C. S. JOHNSON COMPANY
Koehring Subsidiary CHAMPAIGN, ILLINOIS

More Yards MOVED PER H.P.

because every Main Shaft rolls on Anti-Friction bearings

On the Koehring 205 engine horse power rides to work in style, on anti-friction bearings. All major shafts—drum shaft, counter shaft and swing shaft—are mounted on ball bearings. Because there's little friction to waste engine horse power, greater digging force gets to the business end. Power saved pays off in extra yardage. Lubricating time is reduced, because bearings are sealed tight to hold lubricant, to lock out dirt and moisture.



KOEHRING COMPANY
MILWAUKEE 10, WISCONSIN
Subsidiaries
JOHNSON • KWIK-MIX • PARSONS

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

THE NEW *Brōs* ROTARY

. . . *Out-Performs* ALL SNOW REMOVAL METHODS

● The most efficient and fastest snow remover and loader made. That's the claim, already proved and approved, for the NEW *Bros* Sno-Flyr

Whether it is on a snow-coated road or a drift-blocked highway, Sno-Flyr speedily cuts clean, wide paths. The exclusive *Bros* feeder rake with its vertical and forward action, powered by a 170 or 275 h.p. motor, crushes ice and hard-packed snow quickly, feeding it to the dual rotors which cast it through loading chutes into haul-away trucks or to out-of-the-way places.

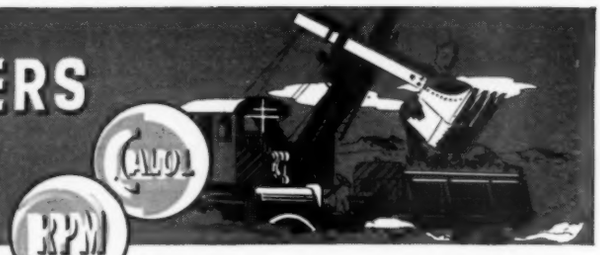
No wintry challenge is too big or too costly Sno-Flyr cuts costs by filling a 5 cubic yard truck in 15 seconds—a job that would take one man one hour by hand shoveling. And the Sno-Flyr loads more than twice the volume of the hand shoveler because of its high velocity delivery. Two men operating a *Bros* Sno-Flyr remove and load as much snow in an hour as can be shoveled by 480 men.

For further information write Wm. *Bros* Boiler and Manufacturing Company, Minneapolis 14, Minnesota.

BRŌS

MANUFACTURERS OF THE FASTEST AND MOST POWERFUL ROTARY PLOWS

STANDARD ENGINEERS NOTEBOOK



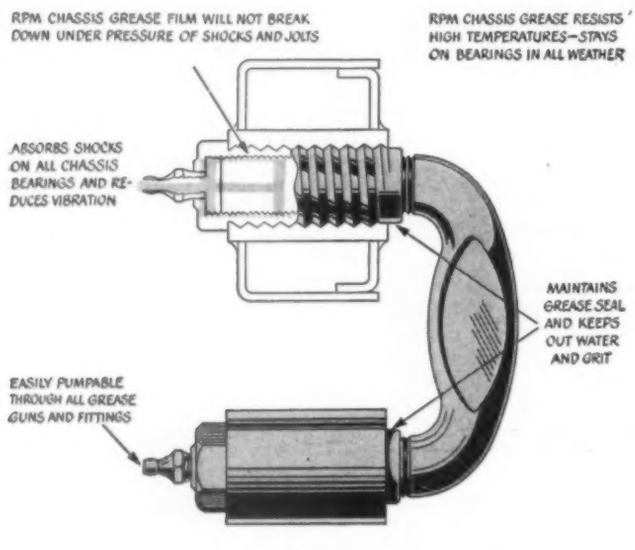
Shock-absorbing grease reduces shackle wear

Because it contains a special stringiness agent that keeps a tenacious lubricant film on shackle and other chassis bearings, RPM Chassis Grease will eliminate squeaks and cut wear to a minimum.

Besides using it on chassis bearings, many truck and bus operators lubricate heavy-duty tractor fifth-wheel bearing surfaces with RPM chassis Grease.

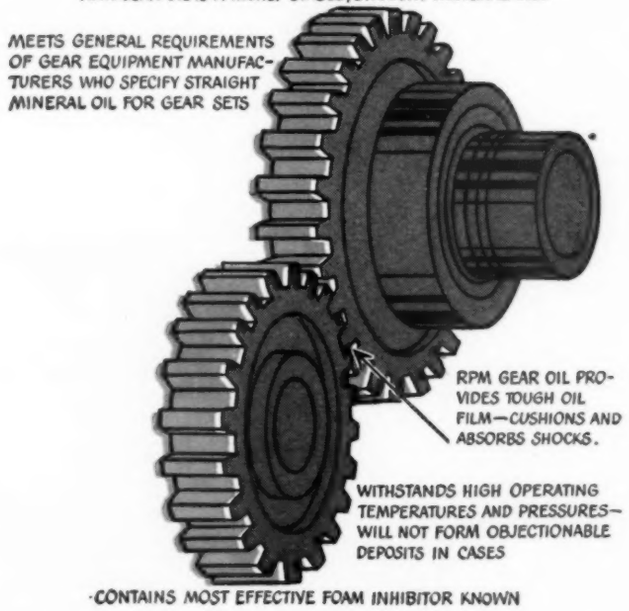
The tough lubricant film acts like a cushion. It absorbs countless shocks imposed on bearings and will not rupture even under an overload. This unusual ability also reduces vibration and makes vehicles ride smoother.

Highly resistant to heat and moisture, RPM Chassis Grease seals out water and grit on and at the edges of bearings. It may be applied easily in cold weather and protects vital wear-points in summer.



U-TYPE SPRING SHACKLE

RPM GEAR OIL IS A HIGHLY STABLE, STRAIGHT MINERAL OIL.



·CONTAINS MOST EFFECTIVE FOAM INHIBITOR KNOWN

Straight mineral oil meets gear-maker requirements

To meet the need for a high quality lubricant for certain transmission gears and other gear sets where a straight mineral oil is recommended, RPM Gear Oil was developed. It is made from the finest paraffinic lubricating oil stocks.

RPM Gear Oil deposits a tough lubricant film on gear teeth and bearings that prevents metal-to-metal contact in all operating conditions. It cools the surfaces and carries away heat. It extends gear and bearing life.

Because RPM Gear Oil is extremely stable, it minimizes trouble from objectionable deposits forming in cases. It eliminates foaming trouble because it contains the most effective foam inhibitor known.

RPM Gear Oil is made in three viscosity grades: SAE 90, 140, and 250. One of these grades will flow freely over gears and their bearings in every atmospheric temperature condition.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Col.; Standard Oil Company of Texas, El Paso, Texas.

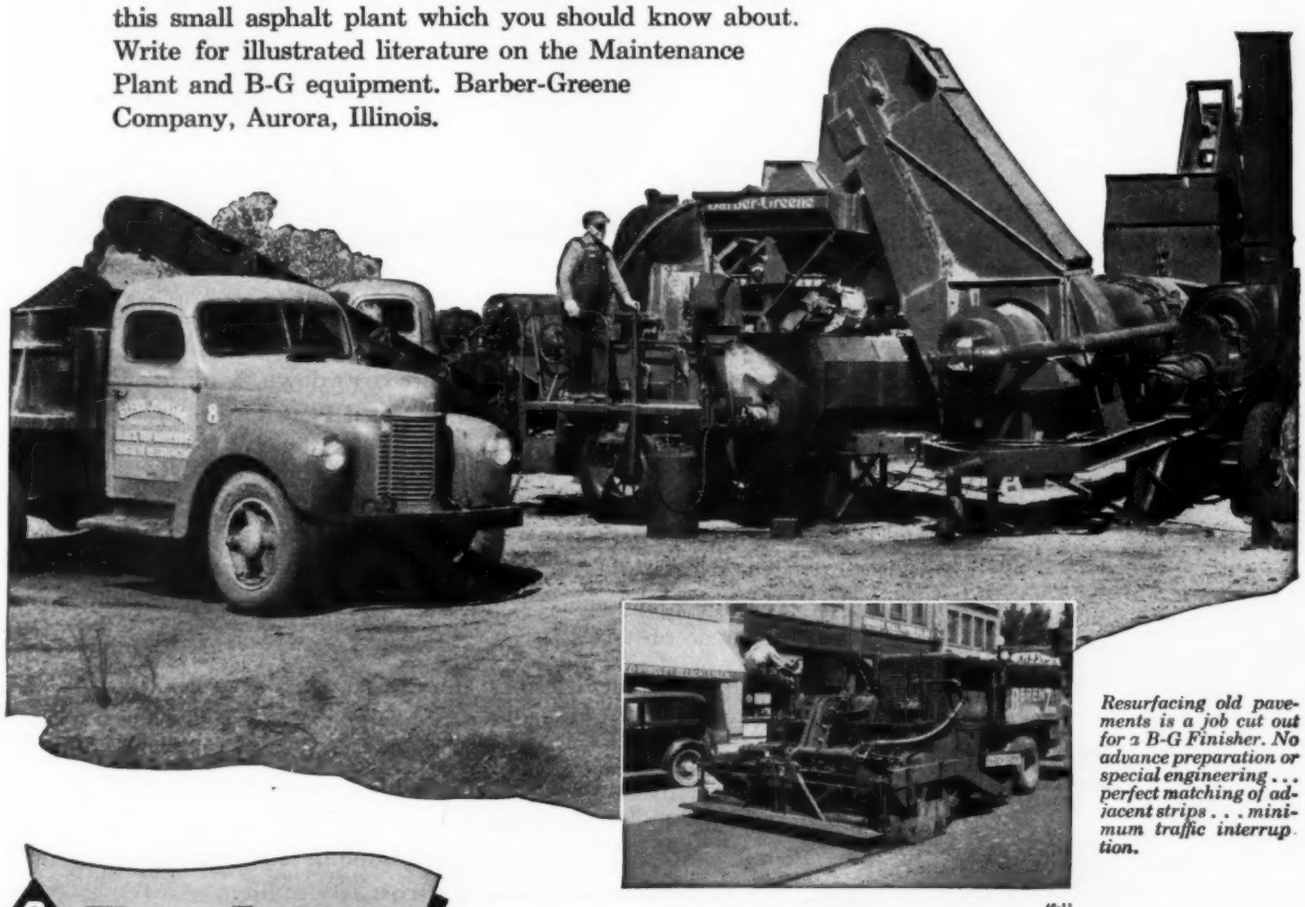
FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

Why a B-G *Maintenance Plant* Can Prepare Any Mix

• Although designed for maintenance work where capacities of 25 tons per hour and less are normal requirements, the B-G Maintenance Plant is fully capable of preparing any mix required. It will do anything its "big brother" mixers will do—it just takes a little longer!

The B-G Maintenance Plant has the same volumetric interlocked proportioning as the larger Barber-Greene Mixers. Calibrated gates—with bitumen pump interlocked to the aggregate feeder—assure a constant, accurate percentage of all ingredients. Steam jacketed pugmill and heating coils in bitumen tank permit mixing all types of mixes including those using asphalt cements.

There are many mechanical features and advantages on this small asphalt plant which you should know about. Write for illustrated literature on the Maintenance Plant and B-G equipment. Barber-Greene Company, Aurora, Illinois.



Resurfacing old pavements is a job cut out for a B-G Finisher. No advance preparation or special engineering . . . perfect matching of adjacent strips . . . minimum traffic interruption.

40-11

Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

FAST ASSEMBLY HELPS OFFSET RISING LABOR COSTS

...when you use Toncan Iron Sectional Plate Pipe

When you're striving to hold large drainage structure costs down, don't overlook what you can save in erection with Toncan Iron Sectional Plate Pipe.

A small crew of unskilled men and a competent foreman with a few simple tools and a "gin-pole" can do the job. All needed materials are shipped "knocked-down" and in one lot. Transportation is simplified. Materials are easy to handle. Breakage is eliminated. Excavation is held to a minimum. Accurate cutting and punching of plates combines with specially-designed bolts to speed up erection. Season and weather offer no obstacles.

But that's only part of the overall savings story. Once installed, Toncan Iron Drainage Structures last for years—require no maintenance. High strength and resiliency enable them to carry heavy loads and resist vibration without cracking or crumbling away. And the high rust-resistance of Toncan Iron—obtained by scientifically alloying double the amount of copper found in copper-bearing steels and irons with molybdenum and refined open hearth iron—assures long, low-cost service life.

The Toncan Iron Man in your territory is ready to show you just how Toncan Iron Drainage Structures will save money for you.

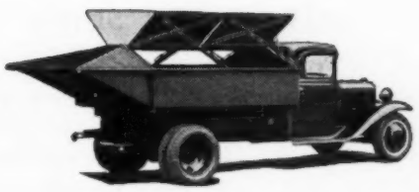
Toncan Culvert Manufacturers' Association
Cleveland 14, Ohio
Toncan Iron . . . A product of Republic Steel Corporation

These Toncan Iron Drainage Products offer efficiency and economy:
CORRUGATED METAL PIPE • PERFORATED CORRUGATED METAL PIPE • CORRUGATED METAL PIPE ARCH • CORWEL SUBDRAINAGE PIPE
SECTIONAL PLATE PIPE • SECTIONAL PLATE ARCHES • SECTIONAL PLATE PIPE-ARCH • FLOOD GATES

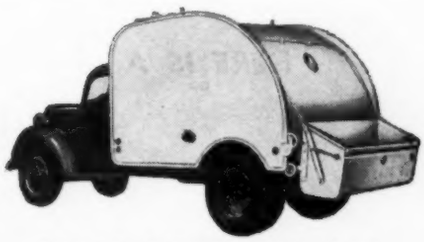
The BEST COSTS LESS

For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.

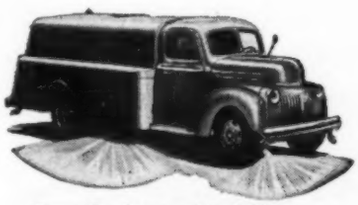
The Load Packer (patented) all enclosed garbage and refuse unit. Compresses loads hydraulically for maximum payloads.



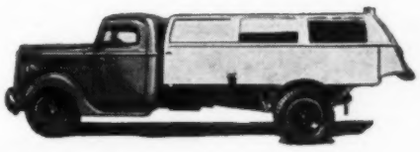
Type C28 scow end Garbage Body. Steel hinged covers extra equipment.



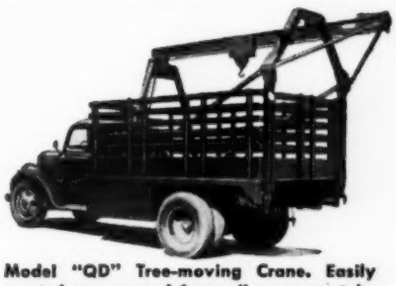
The new Bucket Loader, an all enclosed sanitary refuse disposal unit.



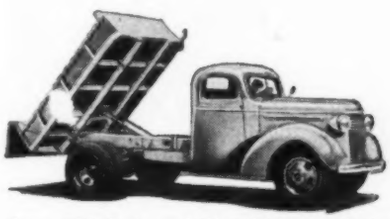
Street Flushers and Sprinklers.



Type C50 Garbage Body with sliding steel covers on each side.



Model "QD" Tree-moving Crane. Easily erected or removed from all purpose stake body.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.

Telescopic boom Crane. Boom radius 8 to 20 feet.

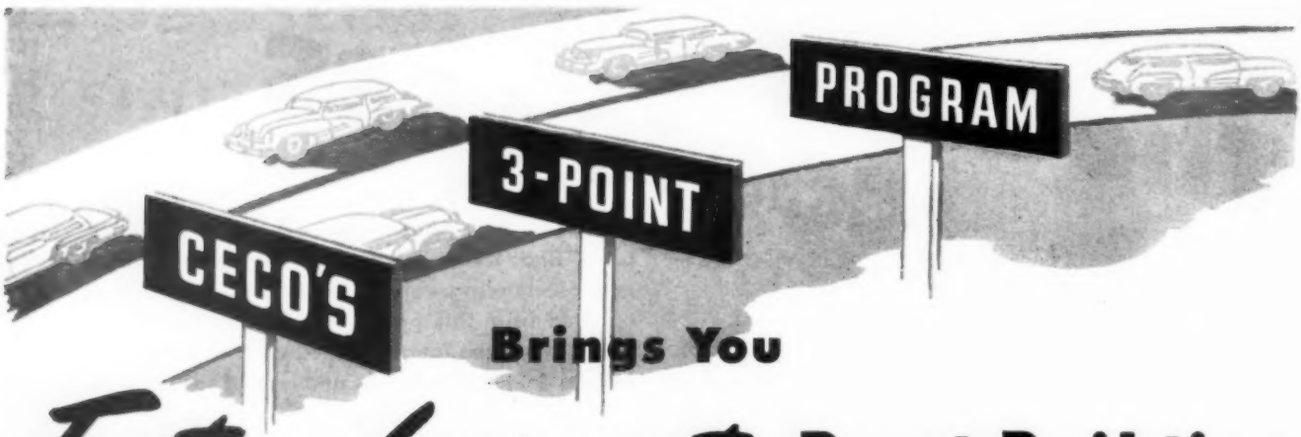
Special W28 Garbage Body, watertight top box. Capacity 7 cu. yds. Type T333 telescopic Hoist.

GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. • DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: • TRUCK TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS



Brings You

Faster, Low-cost Road Building

HERE IS A 3-POINT PROGRAM *FOR SURER ROAD BUILDING PROFITS*

1 You can eliminate guesswork in bidding because Ceco supplies you with accurate data on the cost of materials for your jobs.

2 You can cut down detail work when you deal with Ceco. They supply all data on reinforcing and other highway materials.

3 You can depend on Ceco for a streamlined operation. In one complete order, Ceco gets materials to you as you require it.

CECO ENGINEERING + CONSTRUCTION EXPERIENCE HELPS YOU SOLVE ROAD BUILDING PROBLEMS

Ceco offers you more than precision road building materials. It offers you all the wealth of construction knowledge resulting from years of practical experience. Call any one of 23 offices strategically located coast to coast. Yes, call on Ceco for engineering skill and the finest in construction products.

Welded Fabric, electrically welded at intersections, makes ideal reinforcing.

Cecure Applicator gives positive, even application of Cecure compound.

Typical Ceco Highway Products

- Welded Wire Fabric
- Reinforcing Steel
- Dowel Bar Supports and Sockets
- Metal Center Strips
- Load Transfer Devices
- Stake Pins
- Expansion Joints
- Cecure Curing Compound and Applicators
- Joint Sealing Compound
- Sub-grade Paper

CECO STEEL PRODUCTS CORPORATION

GENERAL OFFICES

5701 WEST 26TH ST., CHICAGO 50, ILL.

In construction products **CECO ENGINEERING** *makes the big difference*

A fleet of TERRA-COBRAS widening *Ignacio-Santa Rosa Highway* north of San Francisco for Harms Bros., contractors

Full loads of 18 cu. yds. on this 1800 ft. round-trip haul, trip after trip, are the rule rather than the exception, with Wooldridge Terra-Cobras. Steep climbs to the top of the cut—fast downhill loading—fast break-away and rapid acceleration to top speed contribute to maximum yardage efficiency. Power and speed combined with positive steering control make possible the handling of tons of earth in less time at a lower cost—and with greater safety to operators and equipment. Easier all-around handling of the Terra-Cobra results in less operator fatigue and higher hourly averages. Why not plan to key your earth-moving operations to Wooldridge Terra-Cobras? Get full details, today.

WOOLDRIDGE
MANUFACTURING COMPANY
SUNNYVALE, CALIFORNIA · U.S.A.

TERRA COBRA
Hi-Speed Self-Propelled ***EARTHMOVERS***

WOOLDRIDGE
EARTHMOVING EQUIPMENT
Includes

★ **SCRAPERS**
Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.

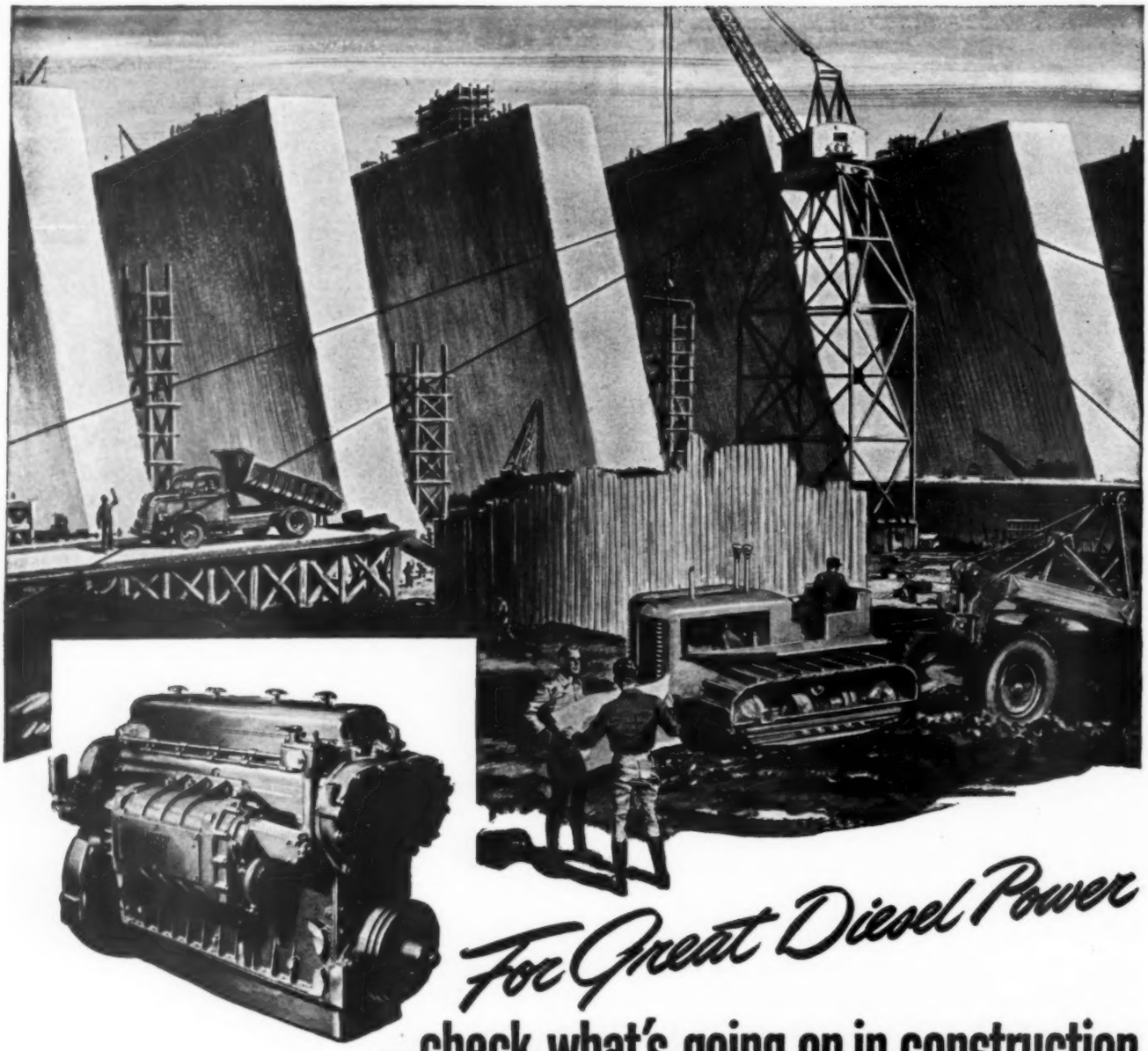
★ **POWER CONTROL UNITS**
Single and multiple drum with universal or roller fairleads.

★ **BULLDOZERS**
Tough and rugged design for standard makes of tractors.

★ **TRAILBUILDERS**
Adjustable angle-blades for standard tractor mounting.

★ **RIPPERS**
Available in light, medium and heavy duty models with two sizes to each model.

DISTRIBUTOR SALES & SERVICE FACILITIES IN ALL PRINCIPAL AREAS & FOREIGN TERRITORIES



For Great Diesel Power
—check what's going on in construction

MODERN construction projects grow on volumes of power. It has to be dependable, hard-hitting, low-cost power.

And what do you find providing that kind of power throughout the industry? General Motors series 71 Diesel engines. You find them in trucks and tractors, in welders and trenchers, in earth movers, graders, compressors, pumps and what-not.

Because these Diesels are compact as well as powerful. They're lower in weight as well as husky. They're easy to start and they stay on the job.

These are qualities that bring Diesel power advantages to operators who couldn't consider it before.

So whatever needs for power you may have in road-making machinery, crushers, shovels or any other construction equipment—look to GM Diesels.

DETROIT DIESEL ENGINE DIVISION
DETROIT 23, MICH. • { SINGLE ENGINES . . Up to 200 H.P. / MULTIPLE UNITS . . Up to 800 H.P.
GENERAL MOTORS

GM
GENERAL MOTORS
DIESEL POWER

Features of GM Diesels Important to Every User of Power

QUICK TO START on their own fuel

LOW COST—run on common fuel oil

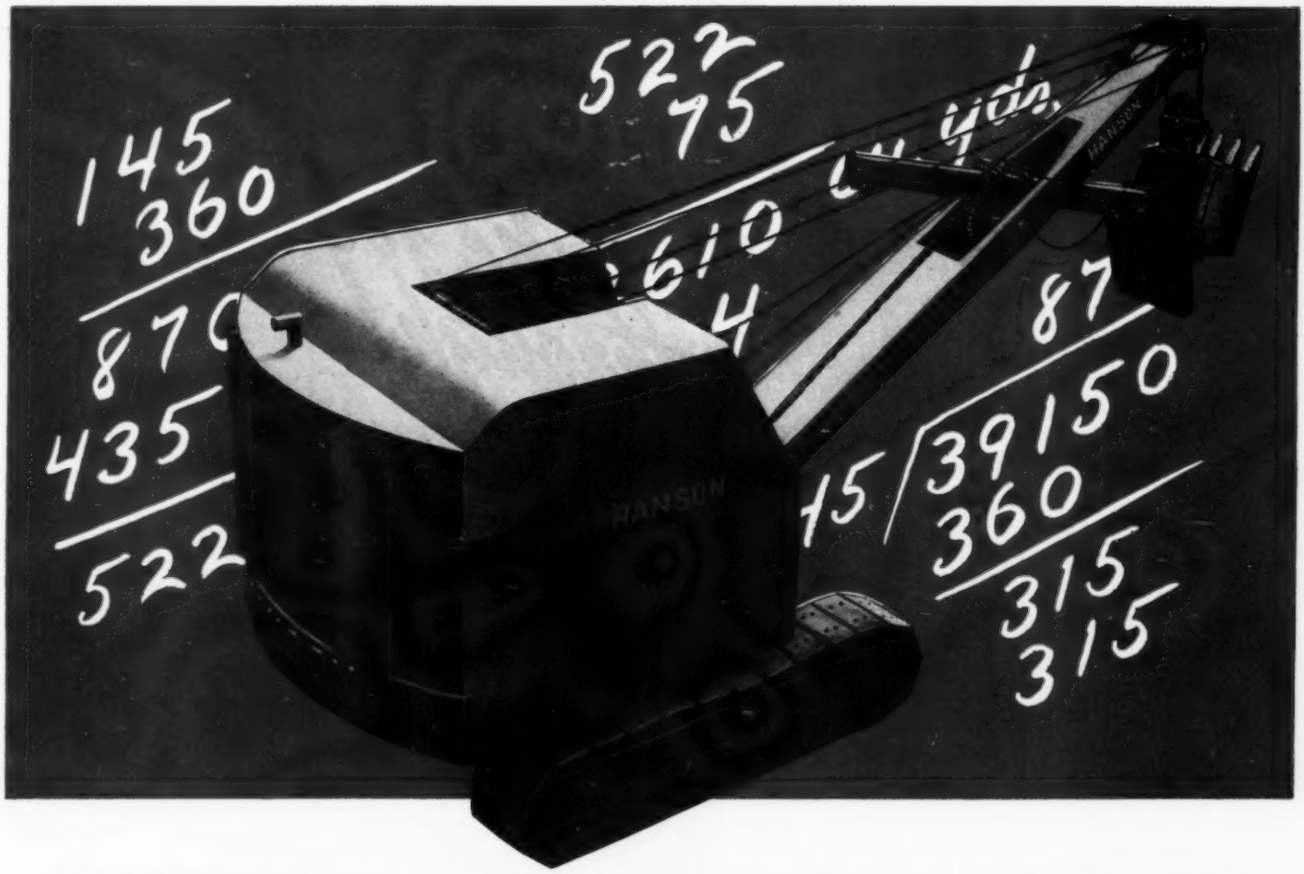
EASY TO MAINTAIN—clean design plus accessibility

LESS FIRE HAZARD—no volatile explosive fuel

COMPACT—readily adaptable to any installation

SMOOTH OPERATION—rotating and reciprocating forces completely balanced

QUICK ACCELERATION—2-cycle principle produces power with every downward piston stroke



WHERE TIME IS MONEY
you need *dependable* equipment

Dependability cannot be bought and sold. It is a combination of design, high grade materials and careful workmanship. Thirty years experience have done much to give Hanson a full measure of appreciation for the meaning of dependability—how important it is to the contractor and—how to build it into construction equipment.

✓ Full Revolving ✓ Chain Crowd ✓ Fully enclosed Steel Cab ✓ Welded Steel Construction ✓ Ball or Roller Bearings at All Vital Points ✓ Disc Type Clutches on Swing ✓ Internal Expansion Booster Type Clutches on Crowd & Hoist ✓ All Clutches easily and quickly adjusted and relined without removing shafts ✓ Air Controlled Steering ✓ Extra Long Crawlers ✓ Heavy duty industrial type motor, Gasoline or Diesel. Hanson Excavators available in either ⅜ or ½ cu. yd. size convertible respectively to 4½ and 6½ ton cranes.

For details of construction—showing simplicity of operation, maintenance and repairs, send for catalog RS-106.

HANSON
CLUTCH AND MACHINERY CO. - TIFFIN, O.

Grinding through miles of drifts, hour after hour, is tough punishment. It takes proved equipment—equipment that has practical, field service behind it.

Check up on the Snogos in service! State after State, County after County, has used them year after year and bought them again and again on the basis of service. You don't have to baby Snogo. You can send your Snogos out and *know* they are going to come back leaving miles of open, safer winter road behind them.

Remember Snogo throws the snow off the road completely and leaves the ditches open to do the job they were built for. Snogo cuts away the deep side of the drift—there will be no hazardous, one-way bottlenecks with half the road open to the center line. Repeat plowing is eliminated and the cost of spring road repair due to uneven frost penetration is materially reduced.

Now is the time to plan ahead. When you are considering your requirements remember Snogo has 19 years of field service in every snow condition behind it.

KLAUER MANUFACTURING COMPANY • DUBUQUE, IOWA

SNOGO

A SNOGO For EVERY BUDGET

Clear Winter Roads mean MORE BUSINESS AND MORE JOBS!

union Wire Rope

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Office and Warehouse, 2415 N. W. 22nd St., Tel. Broadway 9475, C. D. Schooley, Dist. Mgr.

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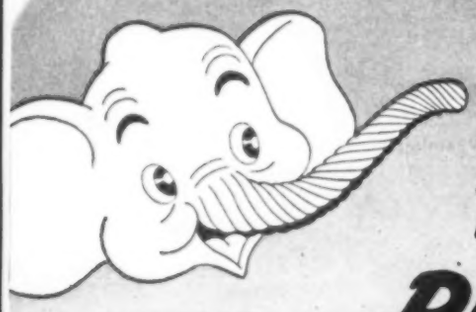
Sales Engineer, L. P. Nixon, 3421 N. W. 21st St., Tel. 9-4469.

TULSA 3, OKLA.
Office Beacon Bldg., Tel. 3-6277. J. A. Undercofler, Dist. Mgr.

ODESSA, TEXAS
Sales Engineer, Frank Morris, 1122 N. Sam Houston, P. O. Box 3272, Tel. 1048.

HOUSTON 11, TEXAS
Sales Engineer, Nelson H. Sullivan, 5803 Navigation Blvd., Tel., Woodcrest 6-4401.

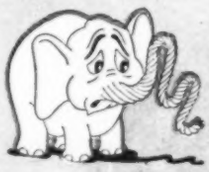


union-formed *For Long Lived* PERFORMANCE

UNION-FORMED RIDES BETTER ON GROOVES . . . does not spin over sheaves or grind through blocks.

UNION-FORMED SPOOLS BETTER . . . even with a light load it winds evenly and tightly.

UNION-FORMED IS SAFER TO HANDLE . . . worn, broken wires do not spring out and porcupine but continue to lie close to the rope.



UNION-FORMED RESISTS KINKING . . . because wires and strands are free of internal stress, they do not fight to get out of their preformed positions.

UNION-FORMED IS FLEXIBLE and RELAXED . . . bends in any direction, yet has "toughness" to withstand jerking and other punishing strain.

UNION-FORMED HAS GREATER RESISTANCE TO BENDING FATIGUE . . . withstands more bends, even reverse bends, because it is more stress-free internally.

union-formed
(Preformed)

THE ULTIMATE LOW COST
WIRE ROPE

union Wire Rope

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Sales Engineer, H. M. Humphrey, 8 Park Circle, Camp Hill, Pa., Tel., Harrisburg 48208.

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Union's Specialists Cover the Map to Give You Unmatched WIRE ROPE SERVICE

Union's is an organization of specialists which devotes its whole time to bettering wire rope.

Here pictured is an important part—the link between user and Union's laboratory and factory. This staff of field specialists man Union's branch warehouses and offices. It works in the field with strategically located distributors.

This not only provides wire rope users with an S. O. S. (service on schedule) source of supply close at hand — it also equips each outlet with the extra "know-how" for proper wire rope application. The end result is better service from better wire rope better fitted to the individual machine and job.

You are urged to make full use of Union's staff of factory-trained field specialists and Union's library of books on wire rope usage.

UNION WIRE ROPE CORPORATION 2200 MANCHESTER AVE. KANSAS CITY 3, MISSOURI

Send wire rope books as checked:

- ☐ Rope Dope No. 1
- ☐ Splicing Wire Rope
- ☐ Socketing Wire Rope
- ☐ Steel Tendons of Industry
- ☐ Wire Rope Lubrication
- ☐ Correct Handling of Wire Rope
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Firm Name _____

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City _____ Zone ____ State _____

● 250 h. p. Walter Snow Fighter mounting front V-Plow and Speed Wings. Clears two lane road with one round trip. Clears at 20-30 m.p.h.

You can't beat blizzards with trucks that are slow-moving while clearing—helpless on slippery surfaces—or stalled by drifts.

You need big, fast, "can't be stopped" Walter Snow Fighters. They have the great power and traction to finish what they start—through the worst snow, drift and ice conditions.

And Walter Snow Fighters finish the job right—clean down to the road surface—because properly mounted plows and center scrapers peel off ice and hard-packed snow, without scarring and gouging the road, or damaging the truck.

This combination of power, traction and speed is due to an exclusive drive system—the Walter Four Point Positive Drive. You get full tractive power at all times, on any surface. There is no wheel-spinning to stall your truck. There is no skidding or side-slipping while operating.

Learn about this and many other valuable features that have made Walter Snow Fighters first choice of highway departments throughout the snow belt. Send for detailed literature, today.

CONTRACTORS! BUILDERS!

Work right into the winter with WALTER TRACTOR TRUCKS

With these husky trucks, you laugh at seasons. The Walter Four Point Positive Drive enables them to haul huge loads through snow, soft dirt, mud and over slippery surfaces. Get the full facts on Walter Tractor Trucks. Write today.

WALTER MOTOR TRUCK COMPANY
1001 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

WALTER
SNOW FIGHTERS

UNIT'S "Big 3"

Designed for FASTER and EASIER OPERATION . . . where the Going is TOUGH!

UNIT 514
½-Yard Dragline

UNIT 1020
¾-Yard Shovel

ALL *Unit Models* are Convertible to ALL *Attachments*

UNIT 357
5-Ton Mobile Crane with Magnet Attachment.

Here are three time-tested UNIT machines that continue to "make the headlines" because of their unusual speed, efficiency and all-around dependability. Check the following exclusive UNIT features: *Compact, streamlined design . . . Straight line engine mounting . . . Drop forged alloy steel gears . . . Automatic traction brakes . . . Interchangeable disc type clutches . . .* One-piece cast gear case . . . and above all, UNIT's safety-promoting *FULL VISION CAB.* No other excavator on the market has all these features.

CONTACT FACTORY DIRECT *for Price and Delivery*

UNIT CRANE & SHOVEL CORP.

UNIT CRANE & SHOVEL CORP. UNIT MILWAUKEE WISCONSIN

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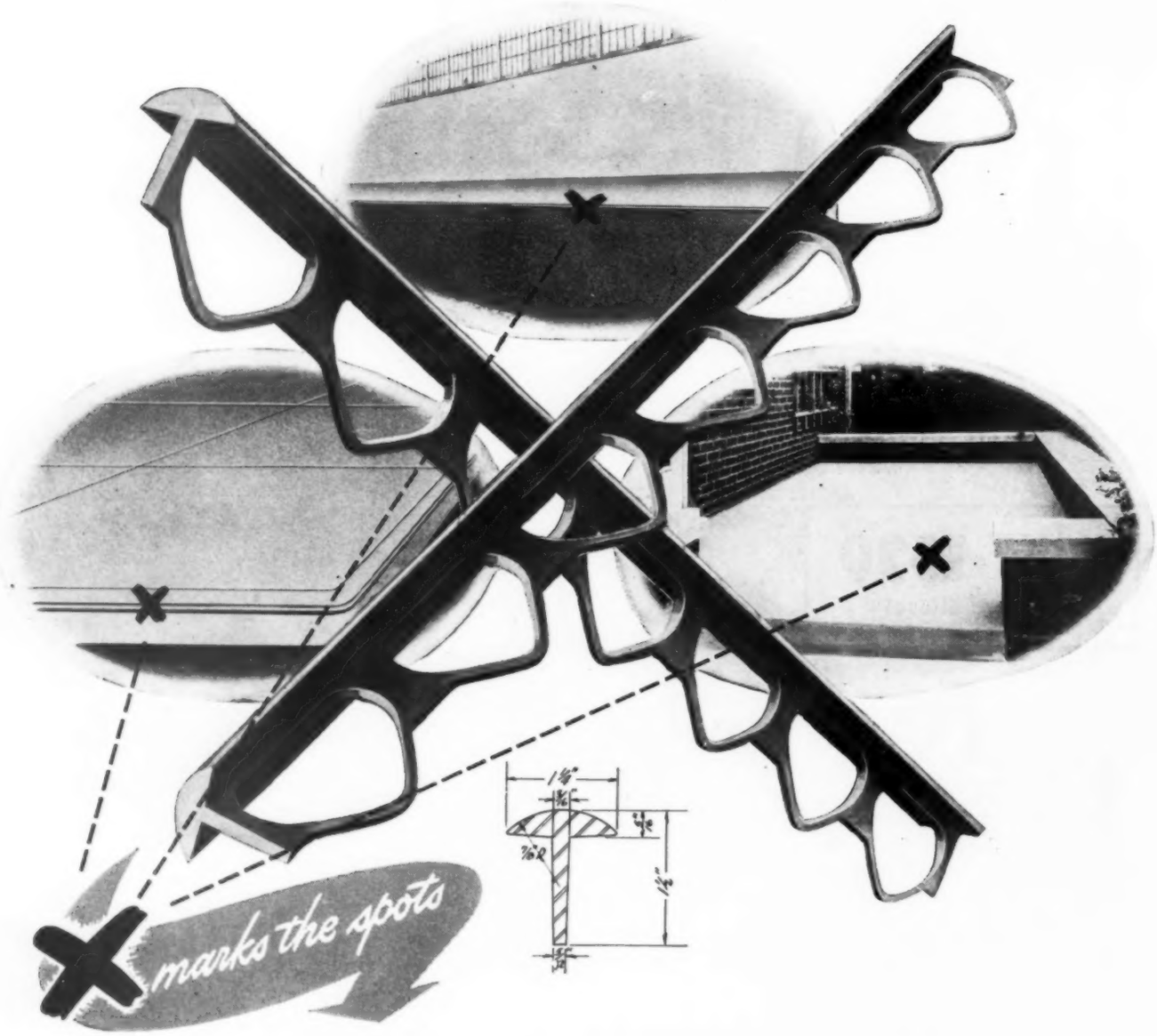


WHERE TRUSCON CURB BARS STAND GUARD!

All unprotected edges of concrete—curbs, loading docks, platforms, walk-ways, etc.—are expensive maintenance items. Give them a coat of protective armor with Truscon Curb Bars. They are manufactured from specially designed roll steel sections embodying these features:

1. Ample width and thickness of plate exposed to wear.
2. Edges of plate beveled to prevent any possibility of "featheredge" forming at junction of concrete and plate.
3. Plate surrounds and protects the corner without splitting the concrete into two portions.
4. Absolute anchorage to the concrete.
5. Unit of plate and anchors, both formed from the same section of steel.

Truscon Curb Bars are now available and are furnished in standard lengths of 6 feet, 8 feet, 10 feet and 12 feet.

TRUSCON STEEL COMPANY

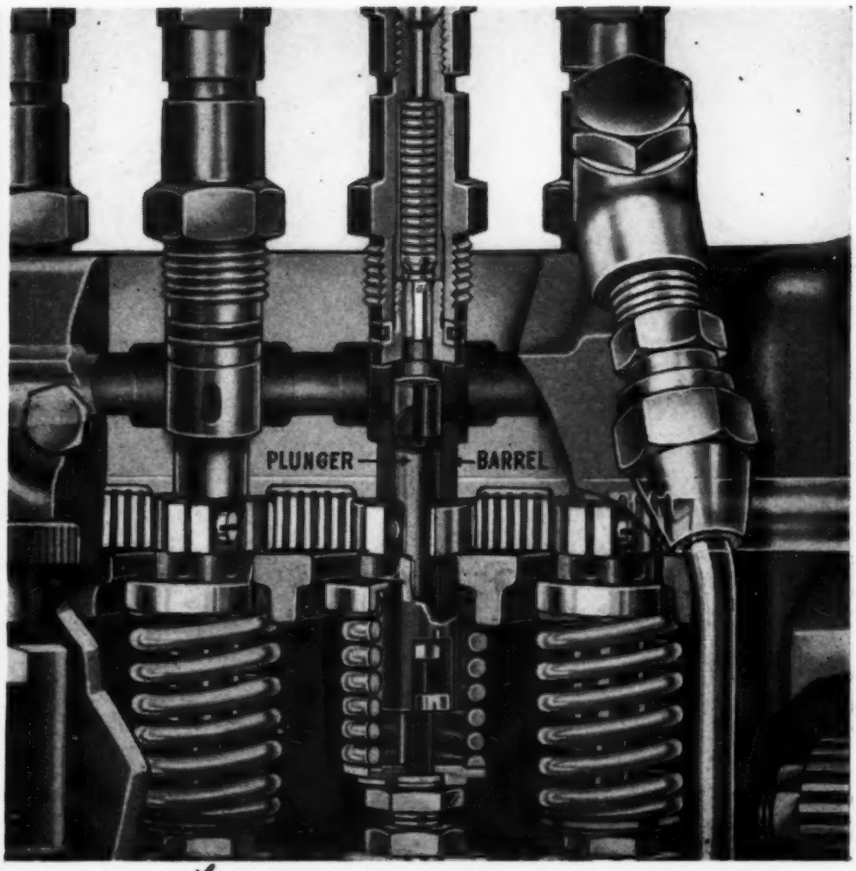
YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of Welded Steel Fabric . . . Concrete Bars . . . Contraction Joints . . . Dowel Assembly Units . . . Curb Bars . . . Complete Steel Buildings.

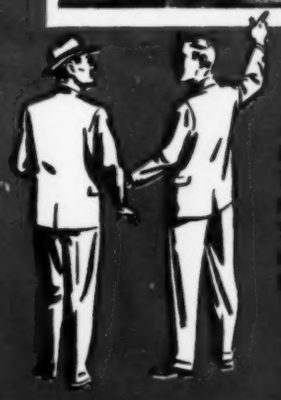
GOOD FUEL INJECTION

Has Friendly Parts

ANY MACHINE can be only as good as its parts. When precision is measured in millionths of an inch in an American Bosch Diesel Fuel Injection Pump it is *vital* that the parts be "friendly" — each to the other.

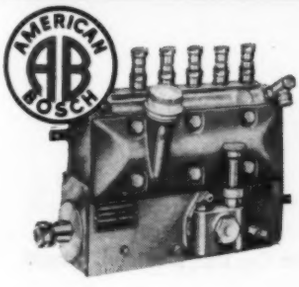


AMERICAN BOSCH Fuel Injection Systems have "friendly" parts. For example, look at the elements that put the fuel under injection pressure, called the plunger and barrel. The fit of these two parts actually is measured in terms of millionths of an inch. So the exacting resources of metallurgy are employed to make sure that the metals of each component are stable and that they will remain that way.



ALL PARTS of American Bosch Fuel Injection Systems are "friendly parts". The result is better engine performance for longer life — and friendly customers. That's why American Bosch equipment is standard on so many of America's Diesel Engines.

Write for a complete directory of American Bosch authorized service stations.



AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

AMERICAN BOSCH

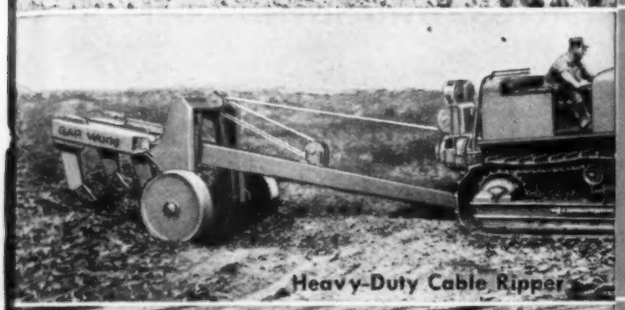
Diesel Fuel Injection

Down-to-Earth Engineering

GAR WOOD Cable Controls Feature Rugged Simplicity and Direct Action Pull

Cable Dozercaster

The cable goes direct to the job in GAR WOOD Cable-Controlled Road Machinery. As a result, it has fast action, positively controlled.

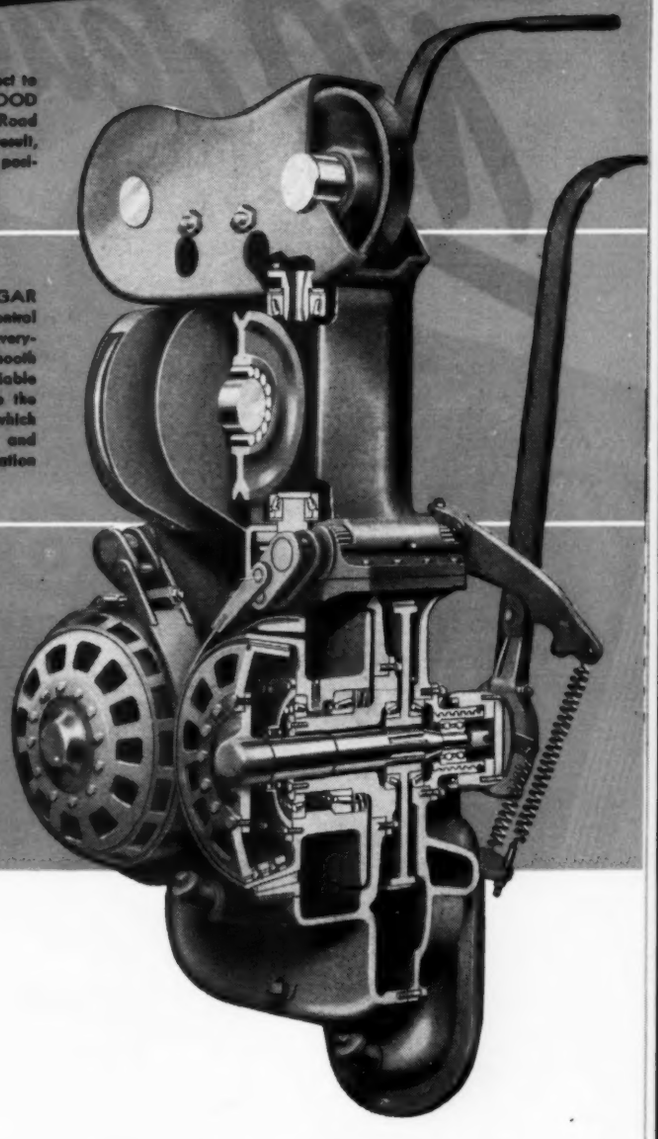


Heavy-Duty Cable Ripper

The job-proved GAR WOOD Cable Control Unit (right) has everything it takes for smooth operation and reliable performance. Note the sturdy steel housing which prevents distortion and serves as a lubrication chamber.

4-Wheel Cable Scraper

Outside clutches and servo-type, self-energizing brakes cool themselves and are readily accessible. Roller bearings throughout and spur-type gears keep adjustments at a minimum.

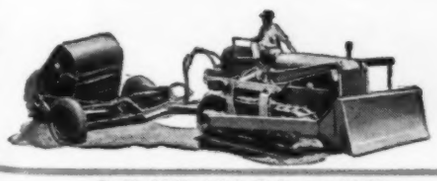


PROVED through the years on the toughest of jobs. Made more rugged than ever by the lessons learned in war action on every front, from Guadalcanal to Okinawa and from Oran to Berlin.

GAR WOOD Road Machinery and the famous GAR WOOD Cable Control Power Unit offers practical design and sound construction, well engineered and honestly built—equipment that *holds together* and can be operated with an absolute minimum of down time. *If it's* GAR WOOD, *it's good.*

See your Allis-Chalmers dealer. He'll be happy to give you all the facts and show you Gar Wood Earth Moving Equipment *on the job* in your own vicinity.

GAR WOOD ROAD MACHINERY
WITH ALLIS-CHALMERS DIESEL POWER



Gar Wood 2-Wheel Hydraulic Scraper and Bulldozer

Gar Wood Hydraulic Dozecaster.

Sold Through
ALLIS-CHALMERS
Dealers Everywhere

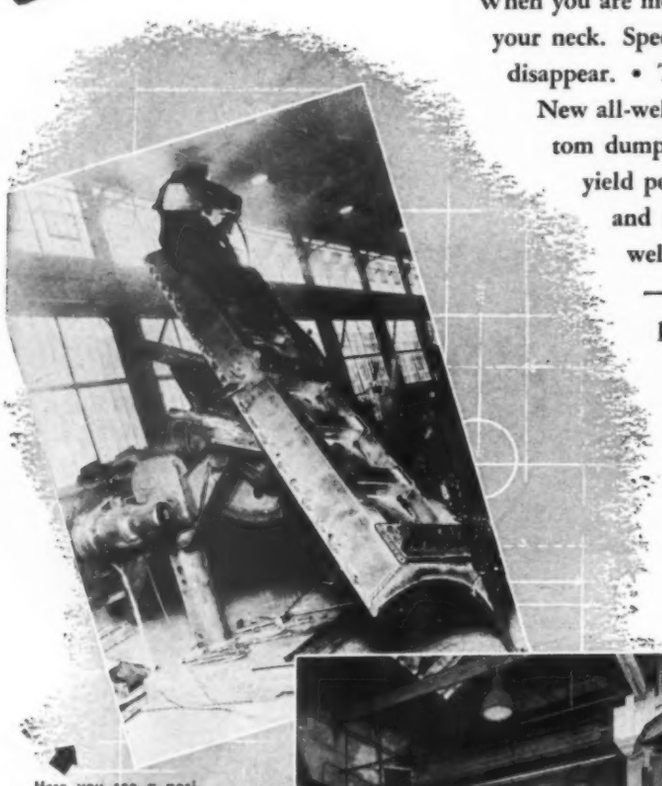
ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, INC.
DETROIT 11, MICHIGAN

OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • TANKS • WINCHES AND CRANES • HEATING EQUIPMENT • MOTOR BOATS

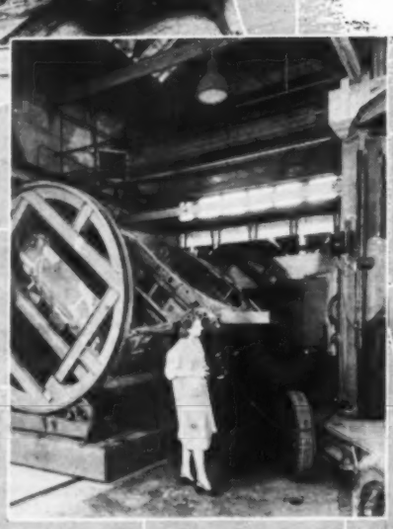
NO dead weight!

. . . that is why HEIL earthmoving equipment gives you larger payloads, faster trips, and lower costs

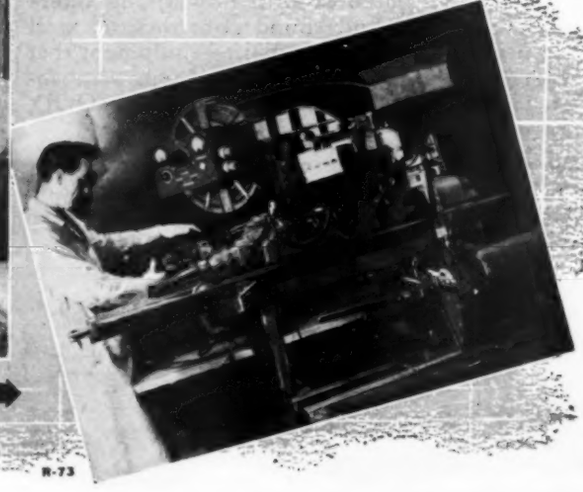
When you are moving dirt and rock, dead weight is like an anchor around your neck. Speed and load are reduced; schedules aren't met and profits disappear. • This problem led to progressive thinking by Heil engineers. New all-welded designs for bulldozers, trailbuilders, scrapers, and bottom dump wagons were created. Materials with an extremely high yield point were used. The results, of course, are lighter sections and much greater strength — dead weight is removed. The welded joints themselves are stronger than the parent metal — there are no rivets, nuts, or bolts to fail. • Definite proof that Heil's lighter but stronger designs reduce earthmoving costs is found in actual job performance reports from all parts of the country. They show that the greatly improved weight-to-power ratio enjoyed by Heil users means larger loads and faster trips. You, too, can easily enjoy the benefits of relentless research and the development of new processes and fabricating techniques. Use Heil earthmoving equipment.



Here you see a positioner. It places the object to be welded in any desired position. This permits "down hand" welding for higher quality. That is why Heil's welded joints are stronger than the parent metal.



Nothing is left to chance at Heil. This X-Ray machine spot checks welds and castings. Quality control such as this accounts for the sturdy dependability of Heil equipment.



Submerged-Arc welding is an example of the modern technique used at Heil. It eliminates the human element—every weld is identical. The improved quality made possible by this new method is one of the reasons why Heil equipment gives less trouble and lasts longer.

R-73

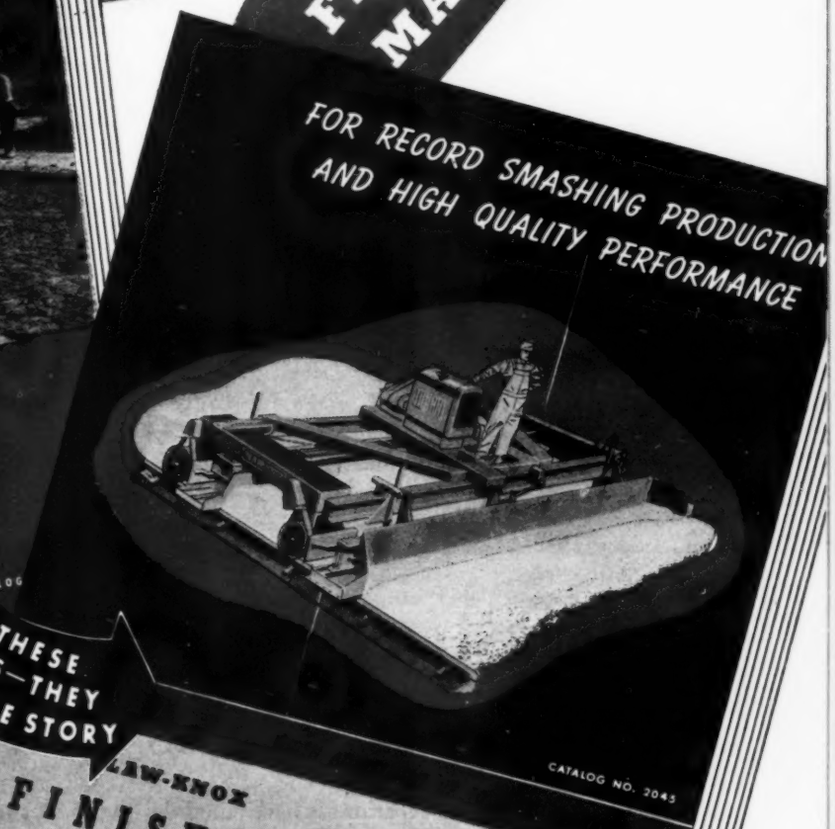
THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

GET BLUE RIBBON PRODUCTION WITH THIS PAVING TEAM

CONCRETE SPREADERS

FINISHING MACHINES



ASK FOR THESE TWO BOOKS—THEY TELL THE WHOLE STORY

HERE— in print and ready for men interested getting jobs done fast—complete information about e finest paving combination you can put behind ving mixers.

Know all about

LAW-KNOX Transverse Blade CONCRETE SPREADERS (Send for Catalog No. 2046)

nd

LAW-KNOX CONCRETE FINISHING MACHINES (Send for Catalog No. 2045)

se machines, and the complete line of Blaw-Knox Con- ction Equipment, are the answers to faster construction and ffitable paving.

ur nearest Blaw-Knox dealer knows the capacity of this uipment for **blue ribbon performance.** Ask him.

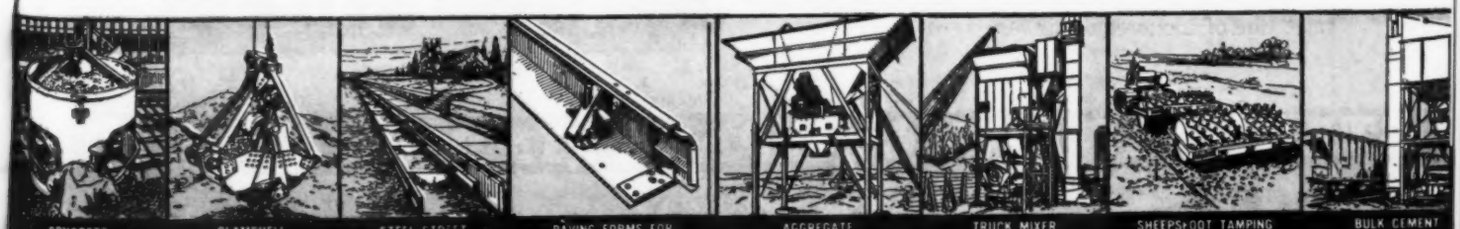
Representatives in Principal Cities

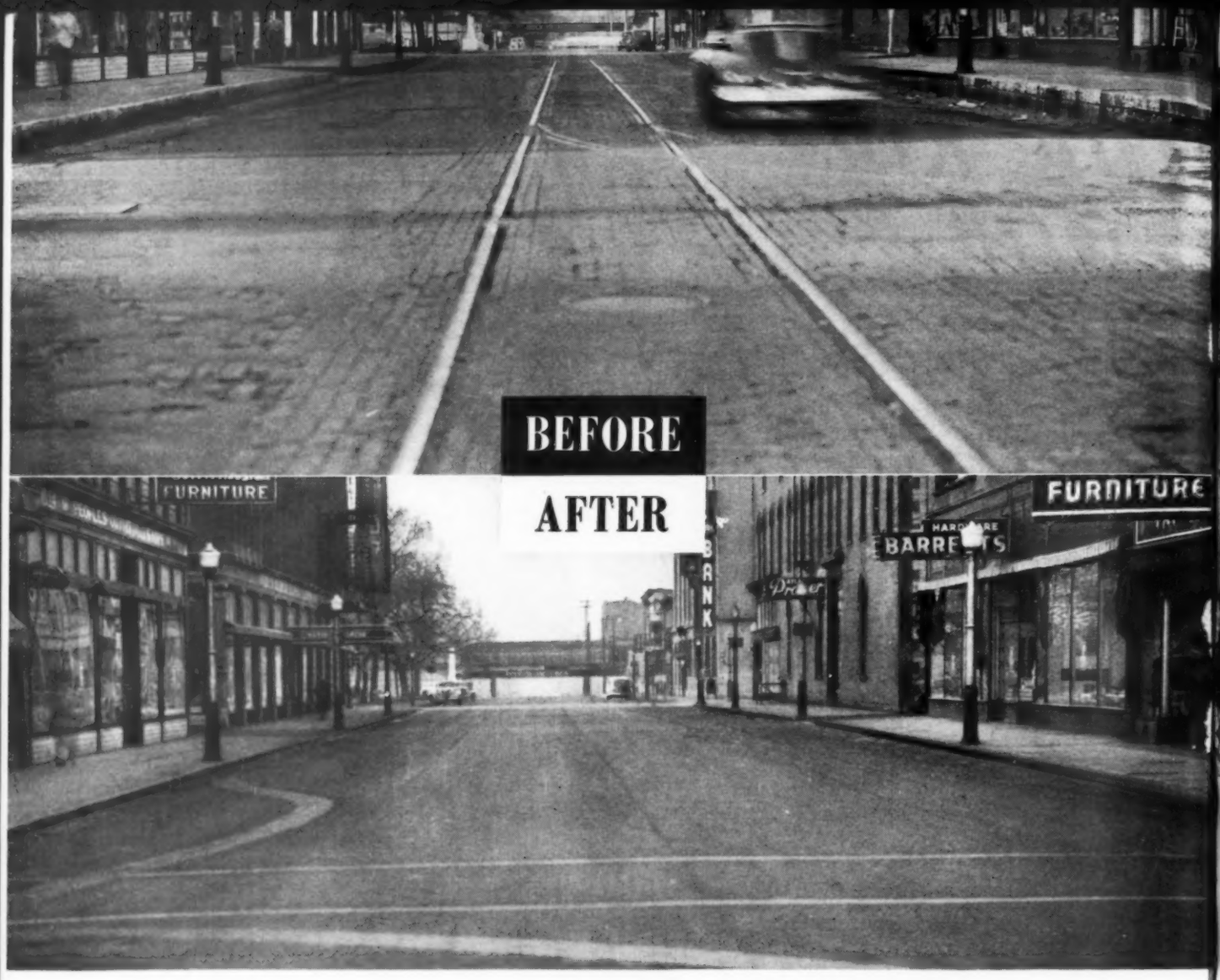
LAW-KNOX FINISHING MACHINE FOR ROADS AND AIRPORTS

BLAW-KNOX

CONSTRUCTION EQUIPMENT

LAW-KNOX DIVISION OF BLAW-KNOX CO., 2003 Farmers Bank Bldg., Pittsburgh, Pa. • New York • Chicago • Philadelphia • Birmingham • Washington





A fast, economical way to restore worn streets and highways . . .

Many street and highway departments have found the answer to today's pressing problem of restoring worn streets and highways by resurfacing them with asphalt. They find that asphalt offers these advantages:

1. It can be applied right over the existing pavement and provides a safe, smooth riding surface.

2. It can be laid quickly with little interruption to traffic. One traffic lane is resurfaced at a time—it's ready for use in a few hours.

3. It is easily repaired to maintain a smooth riding surface at all times.

4. It can be used to widen and modernize narrow roadways, at the same time they are resurfaced, to take care of increased traffic.

5. It can be done with the minimum amount of manpower and materials.

A Standard Asphalt Representative will be glad to give you details of the methods and procedure followed by other highway departments now using asphalt-resurfacing to keep up their highway systems. Call the local Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago 5, Illinois.

STANDARD OIL
ASPHALT

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

You'll like the way it steers

GALION 102 MOTOR GRADER

THE FEEL OF HAND STEERING THE EASE OF POWER STEERING

This view shows the powerful Hydraulic Booster which takes the hard work out of steering the Galion 102 Grader. Extra-rugged front axle, and heavy duty front wheel spindles, heavy leaning wheel arms, and large-size front tires combine to make an extremely rugged front end construction.

The GALION 102 Motor Grader uses combination manual and hydraulic steering. Hydraulic pressure provides the power—but the mechanical gear gives "feel" to the steering, enabling the operator to control the grader with complete precision and confidence under severe blading conditions or in heavy traffic.

Steering a motor grader has always been the hardest part of an operator's job, but with the GALION 102 this "hard work" has been eliminated. You steer it as accurately and easily as a modern automobile.

Features of GALION construction are fully presented in Catalog No. 290. Write for copy.

The GALION IRON WORKS & MFG. CO.
General and Export Offices
Galion, Ohio, U.S.A.

GALION FEATURES THAT ASSURE TOP PERFORMANCE

1. Large front tires.
2. Combination hand and hydraulic steering.
3. Rugged box type main frame.
4. Gear type, four-wheel tandem drive.
5. Full hydraulic control—low pressure system.
6. Heavy front axle construction.
7. Blade pressure of 13,500 lbs.
8. Powerful full Diesel motor.

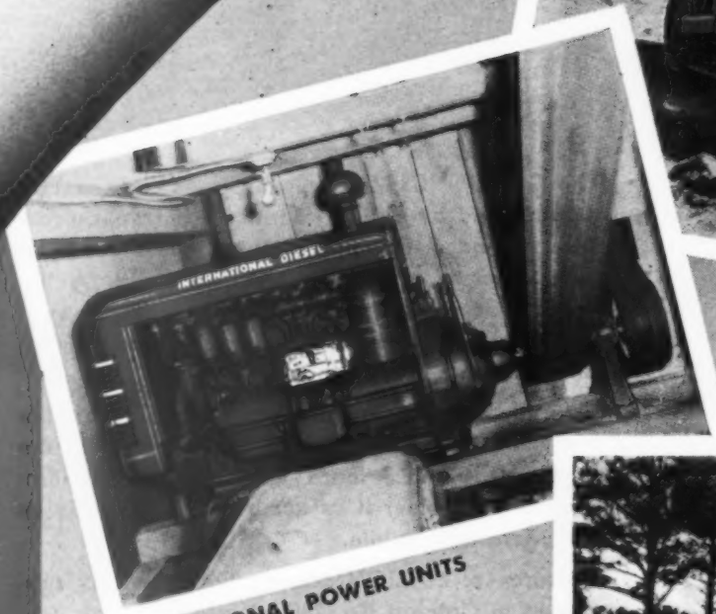
GALION IRON WORKS

GRADERS • ROLLERS

GASOLINE AND DIESEL CRAWLER TRACTORS—

This IH Symbol Means

INTERNATIONAL CRAWLER TRACTORS



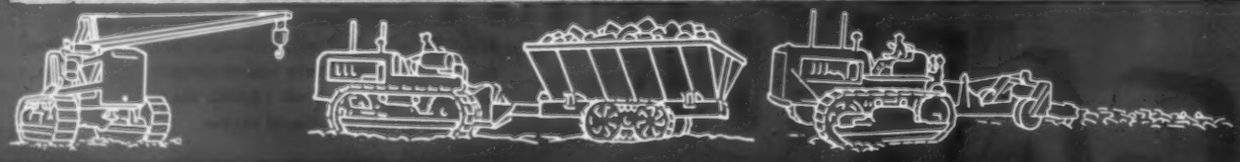
INTERNATIONAL POWER UNITS

INTERNATIONAL WHEEL TRACTORS

The TD-18 Diesel Crawler with bullgrader, clearing and grading a new highway right-of-way in the upper illustration, is one of four International Diesel models currently available. Several additional models will soon be announced.

The UD-18 Diesel Power Unit in the photograph immediately above is the largest of four International Diesel power plants currently available. In addition there are four carbureted models. Several new Diesels will soon be in production.

The ID-9 Diesel Wheel Tractor hauling the wobble-wheel road compactor, at right, is one of two Diesel and four carbureted International industrial wheel tractors currently available through distributors.



INDUSTRIAL WHEEL TRACTORS AND POWER UNITS

Product of

INTERNATIONAL HARVESTER

This symbol, emblazoned on current models of International Industrial Tractors, Engines and Power Units, is your assurance of dependable products, sold and serviced by soundly financed and reputable distributors—and backed by the reputation, resources and facilities of the International Harvester Company.

It marks the establishments set up to serve you most efficiently. It marks the manufacturing works that produce these outstanding tractors and engines.

And when the *new* crawlers, wheel tractors and power units, soon to be offered, have satisfied all engineering requirements and passed exhaustive field tests, this symbol will be found upon their radiator grilles in bold relief.

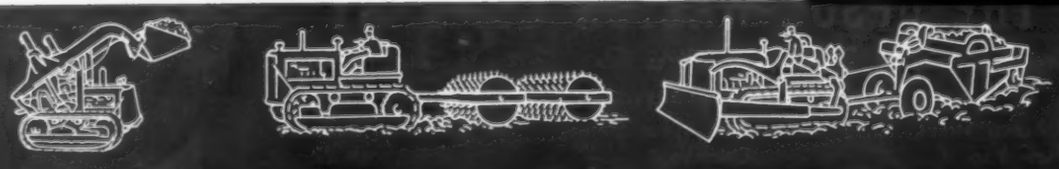
Look for this symbol when you buy power for earthmoving and construction equipment. It is your guarantee that the product bearing it meets all the exacting requirements and specifications that make International Industrial Power products outstanding.

Industrial Power Division

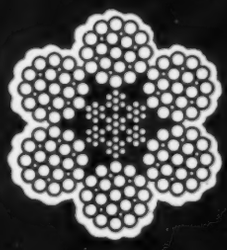
INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue • Chicago 1, Illinois

INTERNATIONAL *Industrial Power*



Best for Heavy Hoisting



UPSON-WALTON
6 x 19 FILLER WIRE CABLE

FOR boom falls on shovels and draglines, for operating ropes on vertical lift bridges, for pan hoist and counterweight ropes on car dumpers—industry after industry has heavy hoisting conditions which are best served by Upson-Walton 6 x 19 Filler Wire Perfection Layrite.

Perfection grade because this improved plow steel is the strongest and toughest and most resistant to wear of all the grades of wire used to make rope.

Layrite because this fine *pre*formed wire rope results in longer life, greater safety, greater economy.

Hemp center or, where hoisting conditions are extremely severe, IWRC (independent wire rope center)

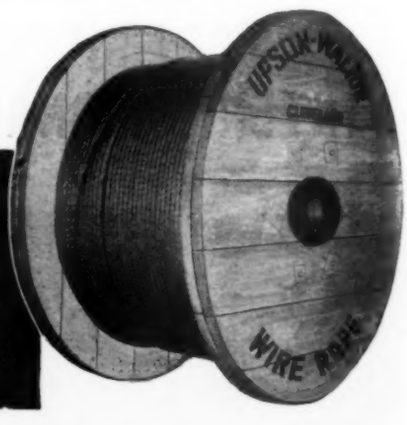
Upson-Walton, 6 x 19 Filler Wire cable is the wire rope which provides a fine balance between coarser ropes, which have good abrasion resistance but poor flexibility, and flexible ropes with less abrasion resistance. *Upson-Walton 6 x 19 Filler Wire cable combines good flexibility with good abrasion resistance.*

The filler wires support uniform outer wires, thereby giving the rope a greater resistance to crushing and other damage where radial pressures and operating conditions are severe. This construction provides a high percentage of reserve or internal strength.

U-W

Established 1871

All Upson-Walton Products Available
Through Your Local Upson-Walton Distributor



THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 · 737 W. Van Buren Street, Chicago 7 · 241 Oliver Building, Pittsburgh 22

FWDs *"Make the Grade"*

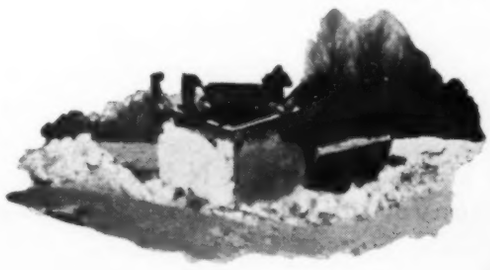
FASTER—AT LOWER COST

Patrolling roads—blading, grading, maintaining—is just one of the many highway jobs FWD four-wheel-drive trucks do faster—at lower cost.

On new highway construction or seasonal maintenance—heavy hauling—snow clearing—or emergency jobs requiring better than usual truck performance, rely on FWDs to do the work with speed, safety, and at low cost.

With driving power fed to all wheels FWD trucks are superior to conventional rear-wheel-drive trucks for work on or off the highway, in severe weather or under difficult road conditions. FWD trucks have ability to carry or tow heavy loads through mud, sand and over mountainous country often impassable to ordinary trucks. On highways they can be operated at higher speed and with greater safety because driving power on all wheels gives the operator better control of truck and load.

THE FOUR WHEEL DRIVE AUTO COMPANY, Clintonville, Wisconsin
Canadian Factory: KITCHENER, ONTARIO



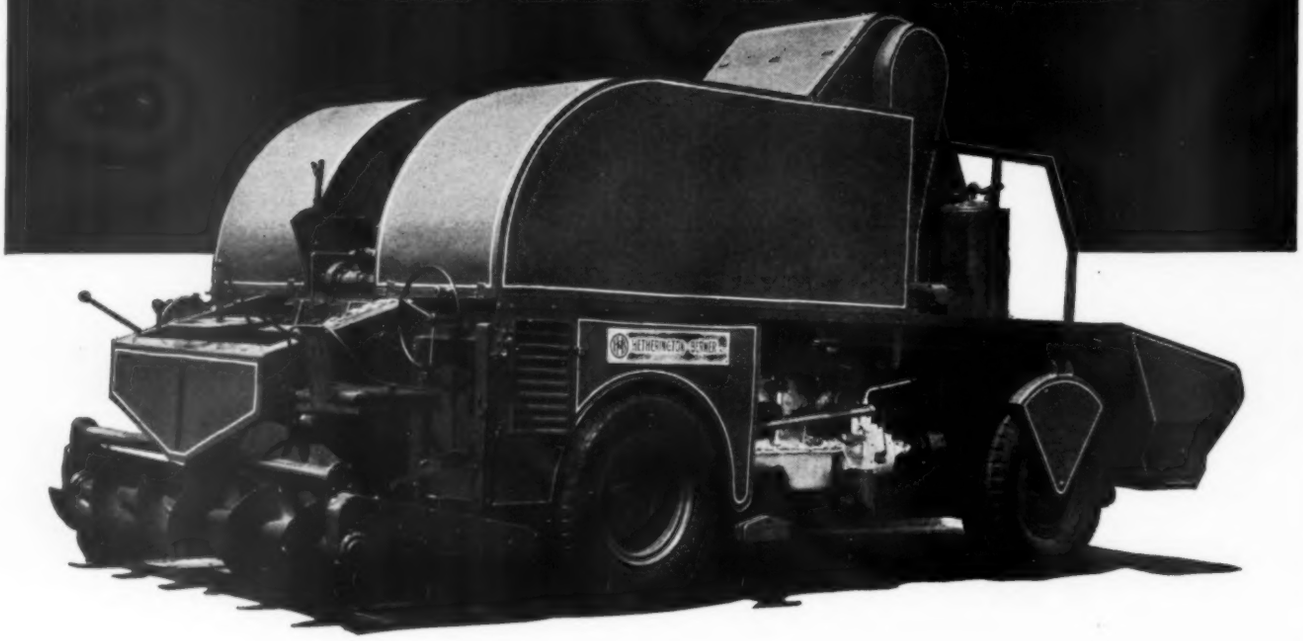
THE ONE TRUCK FOR MANY JOBS

Fast, low-cost snow clearing is another highway job in which FWDs excel. Four-wheel-drive power and traction provides the "push" needed to clear roads fast.

America's Foremost **FWD** ***Heavy-Duty Truck***

AFTER TWENTY YEARS . . .

A NEW AND IMPROVED METHOD OF DOING MIXED-IN-PLACE WORK



The MOTO-PAVER may be used in either of two ways—by dumping the aggregate from trucks directly into the plant on the road, or by picking up the windrowed material off the road with the special loader unit.

One contractor, after watching the MOTO-PAVER perform, said: "I've been in this business for twenty years and this is the first real improved method of doing mixed-in-place work I've seen."

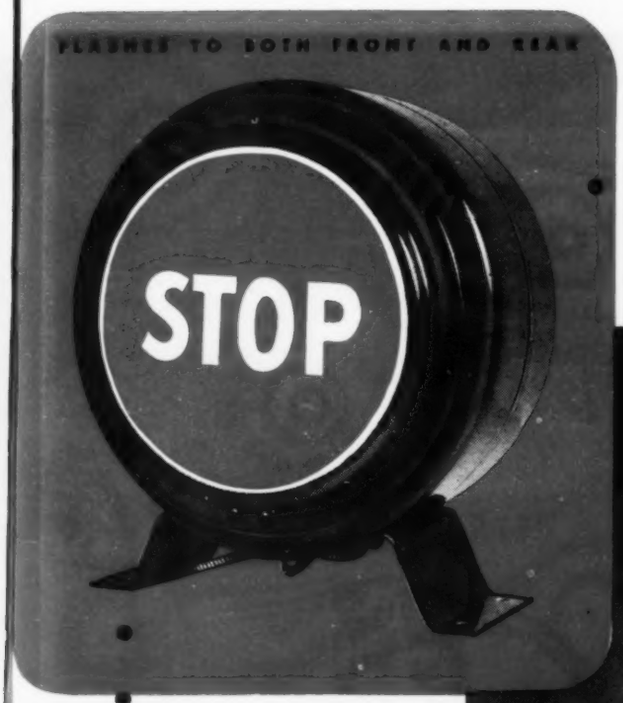
The MOTO-PAVER mixes and paves as it goes—spreading and laying any type of mixed-in-place bituminous material to any width, thickness and crown condition desired. When the job is finished the MOTO-PAVER can be driven, under its own power, to the next job. Paving speed is 4 to 50 feet per minute, road travel speed up to 25 miles per hour, mixing capacity 100 to 120 tons per hour.

The MOTO-PAVER is especially adapted to resurfacing work on county roads and city streets, but is also highly efficient on new construction. Bulletin MP-46 will be sent on request.

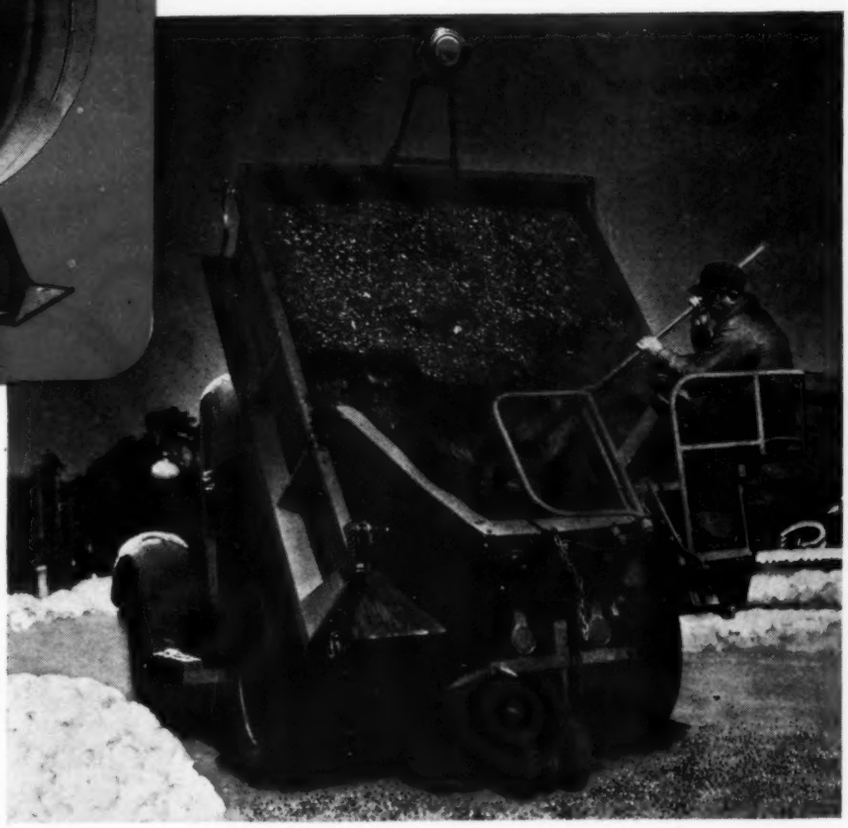
HETHERINGTON & BERNER INC.
721 Kentucky Avenue, Indianapolis 7, Indiana

H&B Moto-Paver

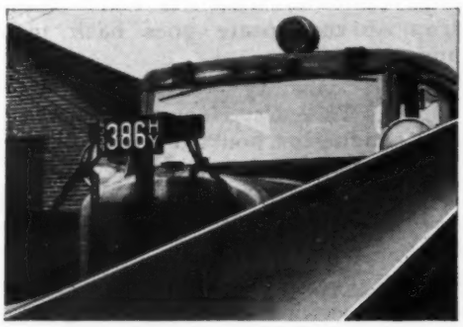
THE COMPLETE TRAVELING MIXER AND PAVER



• • THEY WORK SECURE



• • • • Freed From The Collision-Menace By The "Lighthouse Of The Highway"



This vibration and weatherproof light is supplied with 6½" red lenses, lettered "STOP" or with plain red, amber or blue lenses, for 6 or 12 volt systems.

▸ Cindering trucks, snow plows, sweepers, patrol cars, etc. that operate either at slow or high speeds — park on the highways — become highway hazards without the protection that special warning lights afford.

To prevent your equipment from becoming a menace install Keystone Safety Lights. Mounted on the vehicle's cab, this light flashes 80 storm piercing "STOP" warnings per minute — both to front and rear. Can be seen in weather that blots out other lights. Acts as a "lighthouse" to promote highway safety.

Used by highway departments of New Jersey, West Virginia, Illinois, Connecticut, Maine to name a few; and by countless cities, counties, towns, park and bridge commissions, public utilities, etc. Write us to send a light for two-weeks inspection, using your official stationery. Immediate deliveries! Auto Gear & Parts Co., 16th St. & Hunting Park Ave., Philadelphia 40, Pa.

The "'Lighthouse' of the highway." **KEYSTONE SAFETY LIGHT**

ANYWHERE

WITH SCHRAMM AIR COMPRESSORS!

Construction work indoors, outdoors, on land, on water . . . anywhere . . . Schramm Air Compressors are sturdy enough, compact and lightweight enough, to give you all the compressed air you want!

The construction field likes these Schramm features: 100% watercooled, permitting running with hood "on"; forced feed lubrication; mechanical intake valve; easy to move about on the job!

Schramm Compressors come in a complete range of sizes, to meet your needs. Write today for complete information on Schramm Compressors and Pneumatic Tools.

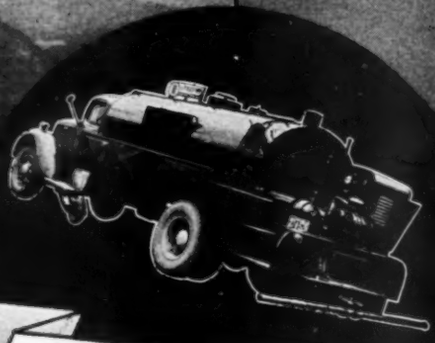
SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

YOU'LL NEVER SEE A DISTRIBUTOR OPERATE AS EASILY AS A "SPRAY MASTER"

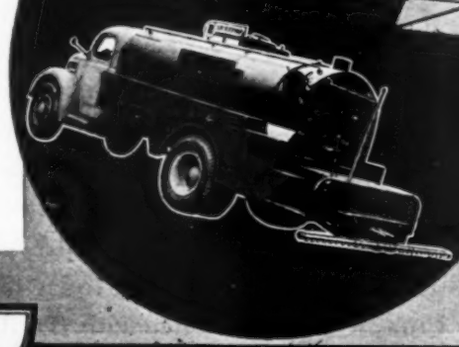
With Vacuum-Flow Full Circulating Spray Bar, the "Spray Master" sprays material at desired Spray Bar Width.

The "Spray Master" will apply Bituminious material to any Road, Street or Highway with the least amount of effort and at less operating cost than any unit of its kind. No matter what width spray bar is desired, up to 24 feet, the "Spray Master" just puts the material down like a carpet. With the Vacuum-Flow Full Circulating Spray Bar the individual nozzles can be turned off giving the desired spray bar width for the job. The operator turns the Single Control Valve to Spray and instantly the most efficient spray job is under way. When the end of the job is reached the operator turns the control valve to Circulate and the spray stops instantly. Circulating by Vacuum eliminates any pressure on the spray bar assuring an instant cut off of the spray. Make your next unit a "Spray Master," the Master of Bituminious material Spraying.



Above—"Spray Master" with Standard 2" tubular spray bar with engine mounted at the Rear.

Below—Front engine "Spray Master" with controls at rear. Choice of Front or Rear Engine can be had.



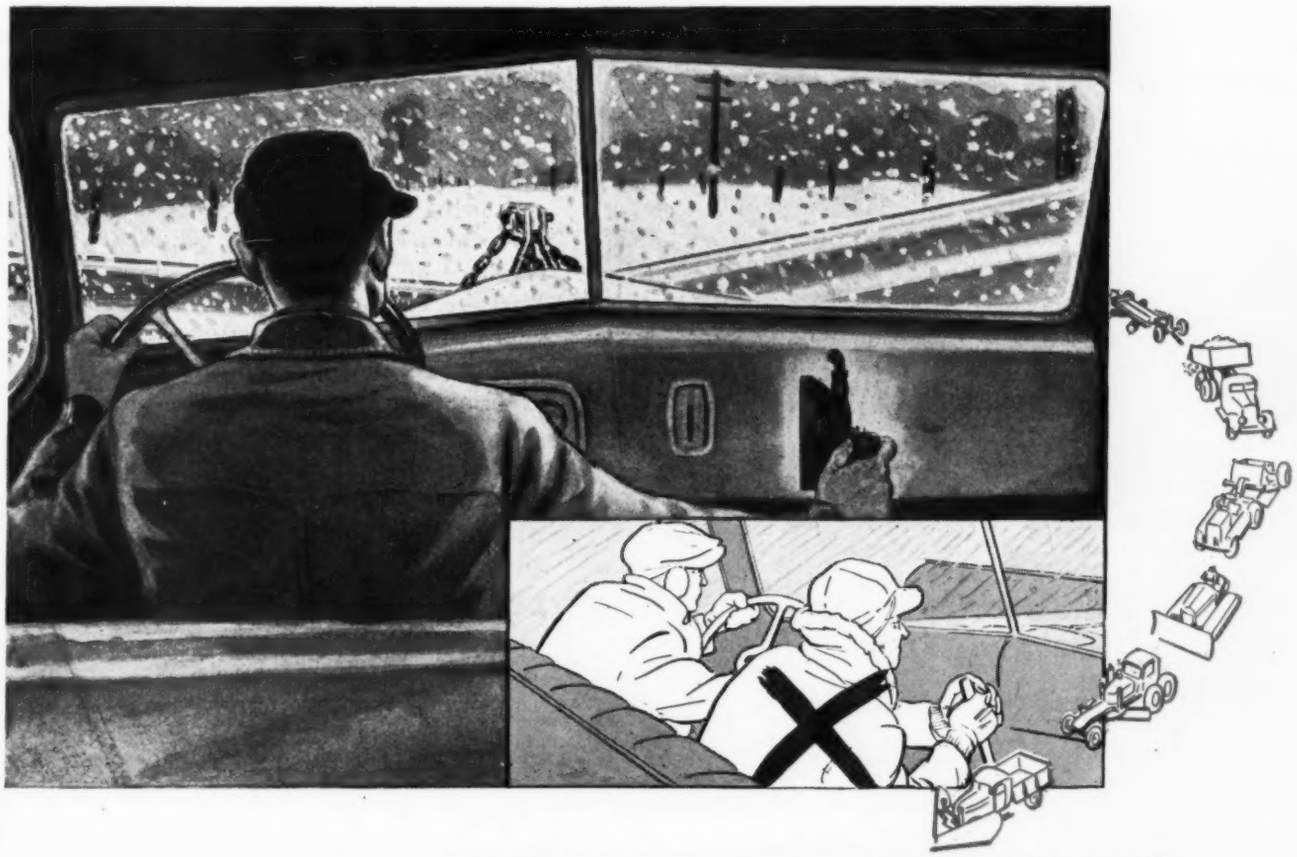
BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE · 1900

LITTLEFORD

LITTLEFORD BROS., Inc.

454 E. PEARL ST., CINCINNATI 2, OHIO

REPLACE MAN-POWER WITH FINGER-POWER!
SPECIFY BLACKHAWK HYDRAULIC CONTROLS



POWER-DRIVEN OR HAND-OPERATED PUMPS

RAMS

CONTROL VALVES

Speed Up Old or New Road Machinery by Adding Blackhawk POWER-DRIVEN Hydraulics

With today's premium on manpower, you'll appreciate the value of labor and time-saving Blackhawk Hydraulic Power-Driven Controls. With manual controls, your men are often kept so busy operating hydraulic hand pumps or mechanical levers that the amount of loads or miles served are reduced, or an extra man must be added. But, there are no hectic moments and no extra help is needed when you have Blackhawk Power-Driven Hydraulic Controls. **No matter what the load, or job, simple finger-pressure on the conveniently located Blackhawk Control Valve puts tons of hydraulic power to work.**

Blackhawk Hydraulic Controls are standard equipment on the majority of snow-plows and on leading makes of much other road equipment. When ordering machinery, specify Blackhawk Hydraulic Controls. And, the changeover of old equipment is simple, too! No complicated power take-offs.

Write your equipment manufacturer for full information.

***A Product of* BLACKHAWK MFG. CO., Dept. RS, Milwaukee 1, Wis.**

Always Specify . . .

BLACKHAWK

Hydraulic Controls

Chrysler Industrial Power is *Earning Power*

Owners of powered industrial equipment in many types of applications depend on Chrysler Industrial Engines to do the job in estimated time—and economically, too.

Rugged, precision-built—compact, low in weight—economical and long-lived because of Chrysler Superfinishing of moving parts, Chrysler Industrial Engines come through, bringing owners and operators real *earning power*.

Be sure you have Chrysler "Pedigreed" horsepower in your industrial equipment. Write to the Chrysler Industrial Engine Division for information or send in the coupon for the Industrial Engine catalog.

Some Applications of Chrysler Industrial Power

Arc Welders	Industrial Lift Trucks
Air Compressors	Industrial Pumps
Booster Pumps	Industrial Tractors
Concrete Mixers	Mechanical Shovels
Cranes	Motor Coaches
Crane Carriers	Portable Sawmills
Crane Loaders	Portable Well Drillers
Farm Tractors	Road Rollers
Fire Pumps	Self-propelled Farm Combines
Fuel Oil Pumps	Soil Pulverizers
Gang Mowers	Street Flushers
Generator Sets	Winches

Moving material—fast—is easy for this sturdy machine.
It's powered by a Chrysler Industrial 6 Engine.

CHRYSLER
INDUSTRIAL ENGINES

Horsepower with a Pedigree

Industrial Engine Division, Chrysler Corp.
12208 East Jefferson, Detroit 31, Michigan

Please send the Chrysler Industrial Engine Catalog.

Name _____

Address _____

City _____ State _____

10

SINCLAIR OPALINE TBT MOTOR OIL

Made specially for gasoline-powered bus, truck, tractor and construction equipment service... where the pull is hard and steady.

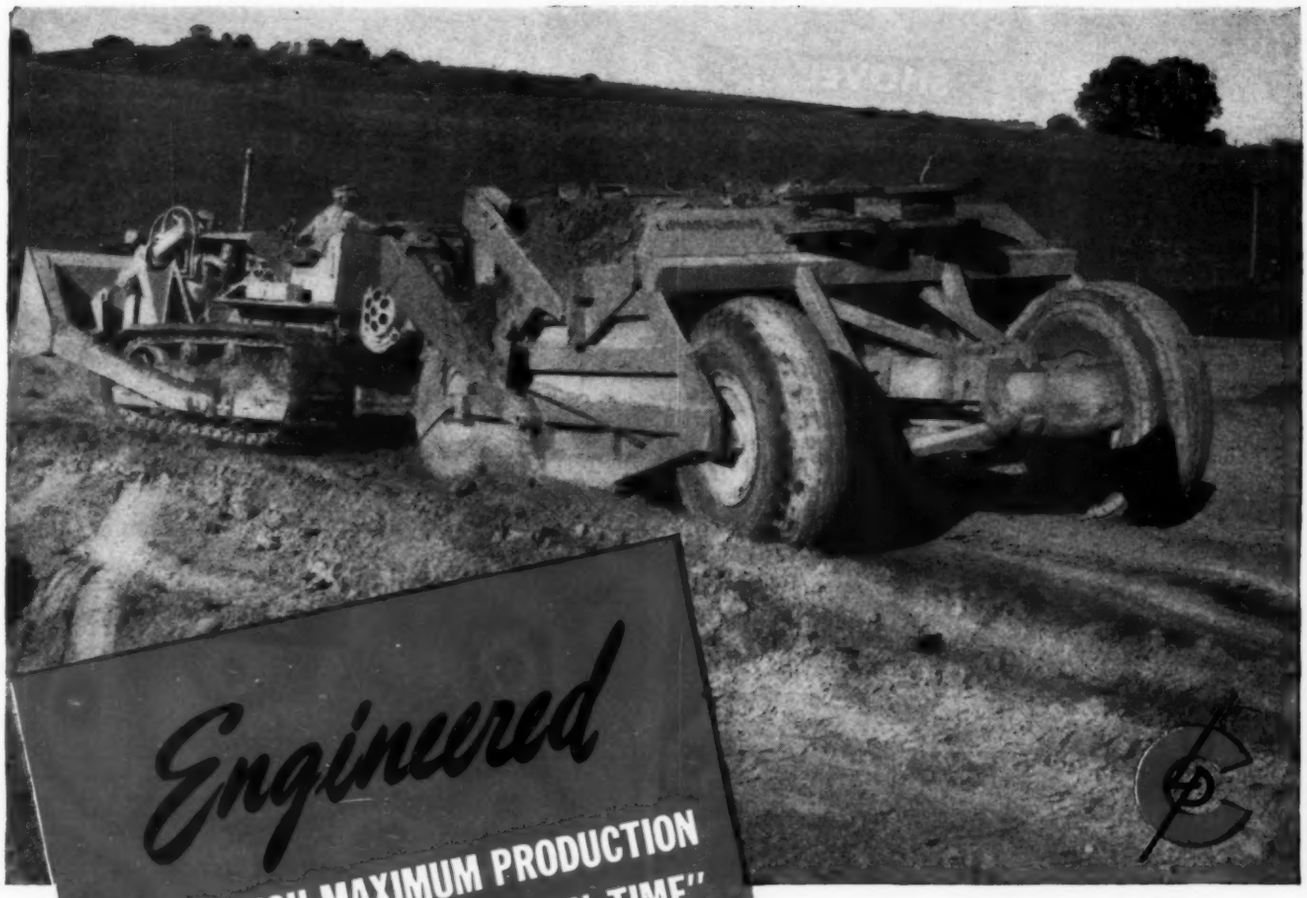
When heavy load imposes extra demands on engines of trucks, buses, tractors and construction equipment, the motor oil must possess *extra qualities.*

Sinclair OPALINE TBT MOTOR OIL is made with special additives to fortify it against oxidation tendency under high temperatures, discouraging gum, lacquer and carbon deposits. Special detergent qualities help keep engines clean; inhibitors protect against bearing corrosion and foaming.

Try this *extra-duty* oil for *extra-duty service.* It's made in grades to suit varied engine designs and operating requirements.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y



Engineered

TO GIVE YOU MAXIMUM PRODUCTION WITH A MINIMUM OF "DOWN-TIME"

1. **Built to "Take it"** — Sturdy welded steel box beam construction plus curved bowl bottom assure plenty of strength without excess weight.
2. **Easy on Cable** — Fewer sheaves plus correct reeving mean increased cable efficiency, longer cable life. Less cable is also required than with competitive models.
3. **Simplified Design** — Gives you interchangeable parts and simplest mechanical movements without "gadgets." All sheaves located where they won't be knocked off or collect dirt.
4. **Improved Axles** — Heavy duty type, adjustable vertically and supported at both ends for proper load distribution and easy removal.
5. **Long Wearing Parts** — Special heat treated steel. Cutting edge is hard-faced, self sharpening and reversible for extra utility. King pin assembly adjustable to eliminate "pounding."
6. **Easy to Service** — All working parts quickly accessible. Wheels and bearings fitted for pressure greasing — wheel bearings easily adjusted without removing wheels.

IN every competitive loading and dumping test to date, the new LaPlant-Choate "Carrimors" have consistently proved their ability to *outperform* other scrapers by a wide margin. But that's only the beginning of the *plus* values you get in these greatly improved LPC outfits. In addition, they have been made stronger, lighter in weight, easier to service on the job. Consequently, you can count on more hours of profitable production, with a minimum of "down-time" for upkeep and repairs. Better see your LaPlant-Choate distributor right away for complete facts on the 8 and 14-yard models. They're going like "hot-cakes!" **LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; Oakland, Cal.**

LaPLANT-CHOATE

Job-Proved Equipment... for Lowest Possible Cost in Moving Earth

DOLLAR for DOLLAR

of First Cost and Operating Cost

THE

3/4-SWING BADGER

MOVES MORE MATERIAL . . .
FASTER AND CHEAPER

Check these BADGER FEATURES

- √ Lighter Swinging Weight
- √ Greater Stability
- √ Better Visibility
- √ No Tail Swing
- √ Extra Dumping Height
- √ Extra Reach
- √ Easily Portable
- √ Fully Convertible

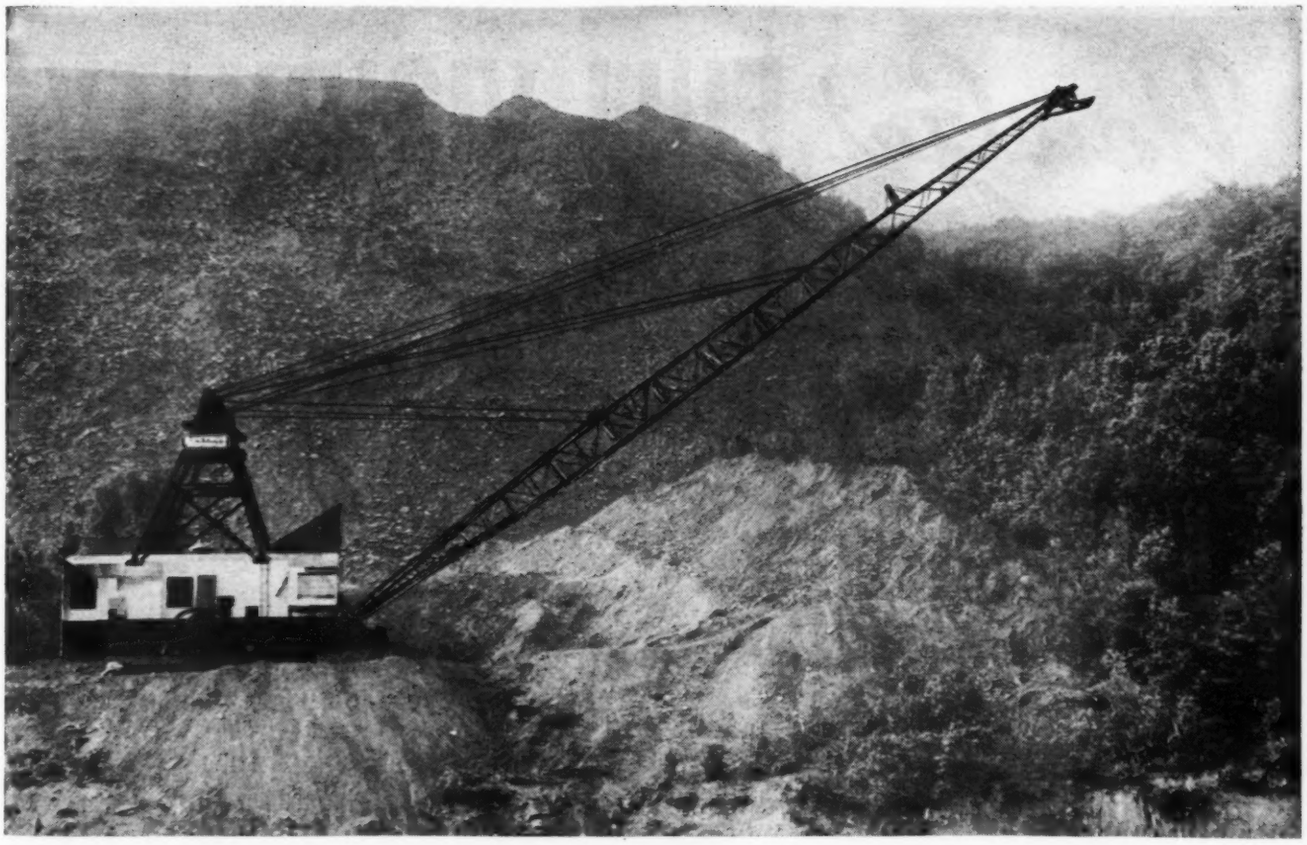
AND ASK YOUR NEARBY A-W DEALER to tell you the whole story of how the versatile BADGER will save time and make money for you.

AUSTIN-WESTERN COMPANY
AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859



THERE'S NO LIMIT ON SIZE

Size, alone, doesn't matter! C. I. T. finances purchases of almost every type of construction equipment . . . and whether the amount involved be large or small, the funds can be obtained quickly and AT LOW COST.

Contractors acquire new and used equipment by making only moderate initial investments. Working funds are left free for tax payments, supplies, pay rolls and other expenses. Terms are arranged which permit equipment to help pay for itself out of earning capacity.

Select the equipment you require . . . tell us what you want to buy . . . how you wish to pay for it. As quickly as delivery can be obtained, a C. I. T. check completes the transaction. Any of these offices will gladly arrange all details for you promptly.

Send for a booklet explaining this construction equipment financing plan.

ONE PARK AVENUE, NEW YORK

333 N. Michigan Avenue
CHICAGO

223 Peachtree Street
ATLANTA

C.I.T. CORPORATION
INDUSTRIAL FINANCING

660 Market Street
SAN FRANCISCO

416 West 8th Street
LOS ANGELES

In Canada: CANADIAN ACCEPTANCE CORPORATION LIMITED,
Metropolitan Building, Toronto, Canada

AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

You Get FULL VISIBILITY

with the BUCYRUS ERIE DOZER-SHOVEL

Your operator can always see what he's doing on a DOZER-SHOVEL. In shovel operations he can see the bucket as it enters the digging, watch it get a full load. He can see the ground over which he must move to reach his dumping position. He can see to spot the bucket exactly where he wants it for accurate dumping. In 'dozing, the operator can see just what he's doing. There are no frames, winches, hydraulic cylinders or other obstructions to block the operator's full front vision on the DOZER-SHOVEL. That means faster, safer operating cycles day-in and day-out.

There are other features, too, which make the DOZER-SHOVEL unique. Combined with a Trac-TracTor it makes a balanced digging unit which retains all the inherent characteristics of the tractor. Ask your International TracTracTor distributor what that will mean to you. Ask him, too, about the DOZER-SHOVEL'S oscillating tracks, low clearance and other features offered by no other machine.

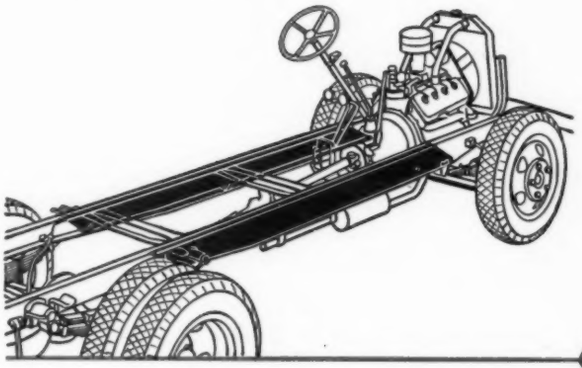
18T45

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

REGISTRATIONS *SHOW* IT — OPERATORS *KNOW* IT!

"FORD TRUCKS LAST LONGER!"

One big reason—
FORD FRAMES STAND UP!



One of the big reasons why 78 per cent of all Ford V-8 Trucks ever built are still in use, is found in Ford frame engineering. Ford Light Duty Half-Ton units, for instance, have true *truck* frames—parallel side-rails—full SAE 34-inch width, taking standard bodies—rear kick-up and side-mounted springs for extra-low load height—alligator jaw cross-member—great strength and rigidity, for longer life to cab and body. The full-channel side-rails of Heavy Duty frames are *doubled* between springs, as illustrated, increasing side-rail strength 46 per cent—a construction far superior to old-fashioned fishplates.

Ford

Ford 134-inch wheelbase Heavy Duty Truck, with Thornton drive and 4-6 cubic yard Dump body by Anthony Co., Streator, Ill.

Only Ford offers all these long-life features: choice of 2 great engines, the 100-H.P. V-8 or the 90-H.P. Six—Flightlight aluminum alloy, 4-ring pistons—short, rigid, fully counterbalanced cast alloy steel crankshaft—big brakes, with non-warping, score-resistant cast drum surfaces—extra heavy sheet steel in fenders, hood, cowl and cab—4-pinion differential with triple roller bearing, straddle-mounted axle drive pinion.

There are *more than fifty* such examples of Ford endurance-engineering in today's Ford Truck. NO OTHER TRUCK BRINGS YOU ALL THESE IMPORTANT EXTRA VALUES AT ANY PRICE. Each one adds to the years of faithful service you can confidently expect from your Ford Truck. Let your Ford Dealer point them out to you.

FORD TRUCKS

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

CURE *Concrete* FASTER — BETTER AT LOWER COST BY *Spray!*

TRUSCON TRU-CURE

CHECKS EVAPORATION!

- ★ No Awkward Bulky Mats, Paper or Burlap
- ★ Sprays on Immediately after Finishing
- ★ Used in any Available Spray Gun
- ★ Full "After" Protection— Amazing Economy— Complete, Uniform Curing

OK- Approved by U.S. Army Engineers — Many State Highway Departments

Special Spray Machine for Highway Curing

HIGH WATER RETENTION MEANS PERFECT CURING

Because of its high water-retention properties (97% for critical first 24 hours—90% for 7 days) Truscon Tru-Cure eliminates necessity for clumsy labor and time-consuming evaporation-inhibitors such as paper, earth, burlap, mats or bags. One simple, economical Tru-Cure application produces a water-sealing film that holds evaporation to the proper rate—cures thoroughly and evenly—prevents crazing and hair-checking—assures concrete of excellent quality without mess, waiting or extra material handling. Tru-Cure is sprayed on immediately after finishing and requires no follow-up care.

Tru-Cure may be furnished as a clear liquid or with a fugitive dye which enables the operator to spray evenly and avoid thin spots—without permanently discoloring the concrete. Tru-Cure contains no asphalt, pitch or coal tar to discolor the job. Use on any type concrete construction—sidewalks, curbs, aprons, alleys. Contractors find amazing economies with Tru-Cure. For money-saving hints and complete data, write Dept. E.

TRUSCON LABORATORIES
Affiliate of Devoe & Raynolds Co.
DETROIT, MICHIGAN

Make Sure Your New Shovel Can Take It!

WITH A

MARION

YOU ARE SURE!

MARIONS are engineered and built for tough digging. They are fast, sturdy, powerful, dependable. Let MARION prove this to you.

WHAT IS YOUR PROBLEM?

From 3/4 Cu. Yd. POWER SHOVEL COMPANY MARION SINCE 1884 To 40 Cu. Yds.

MARION

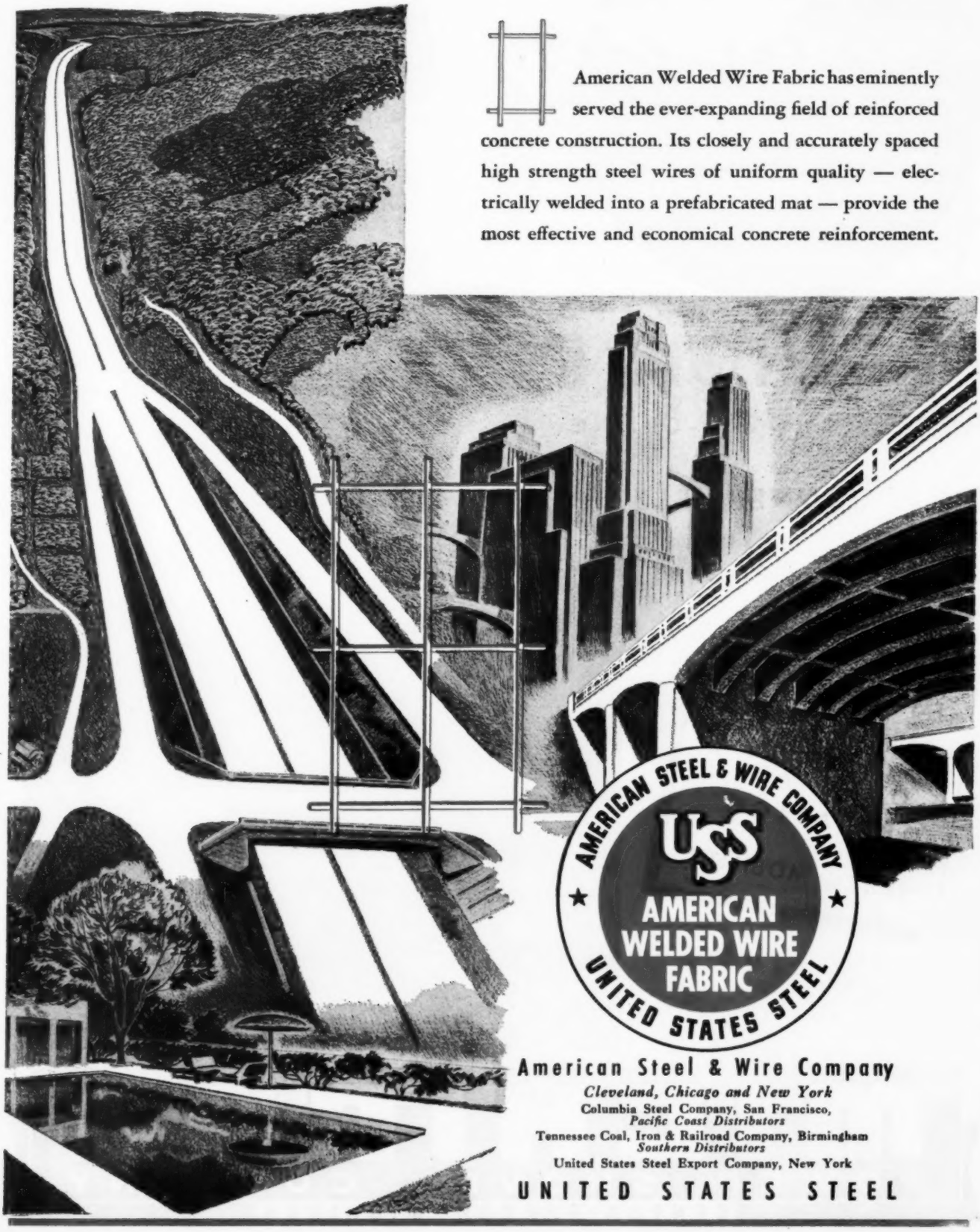
POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities • Established 1884

Plan Concrete Construction

with this Proven Reinforcement

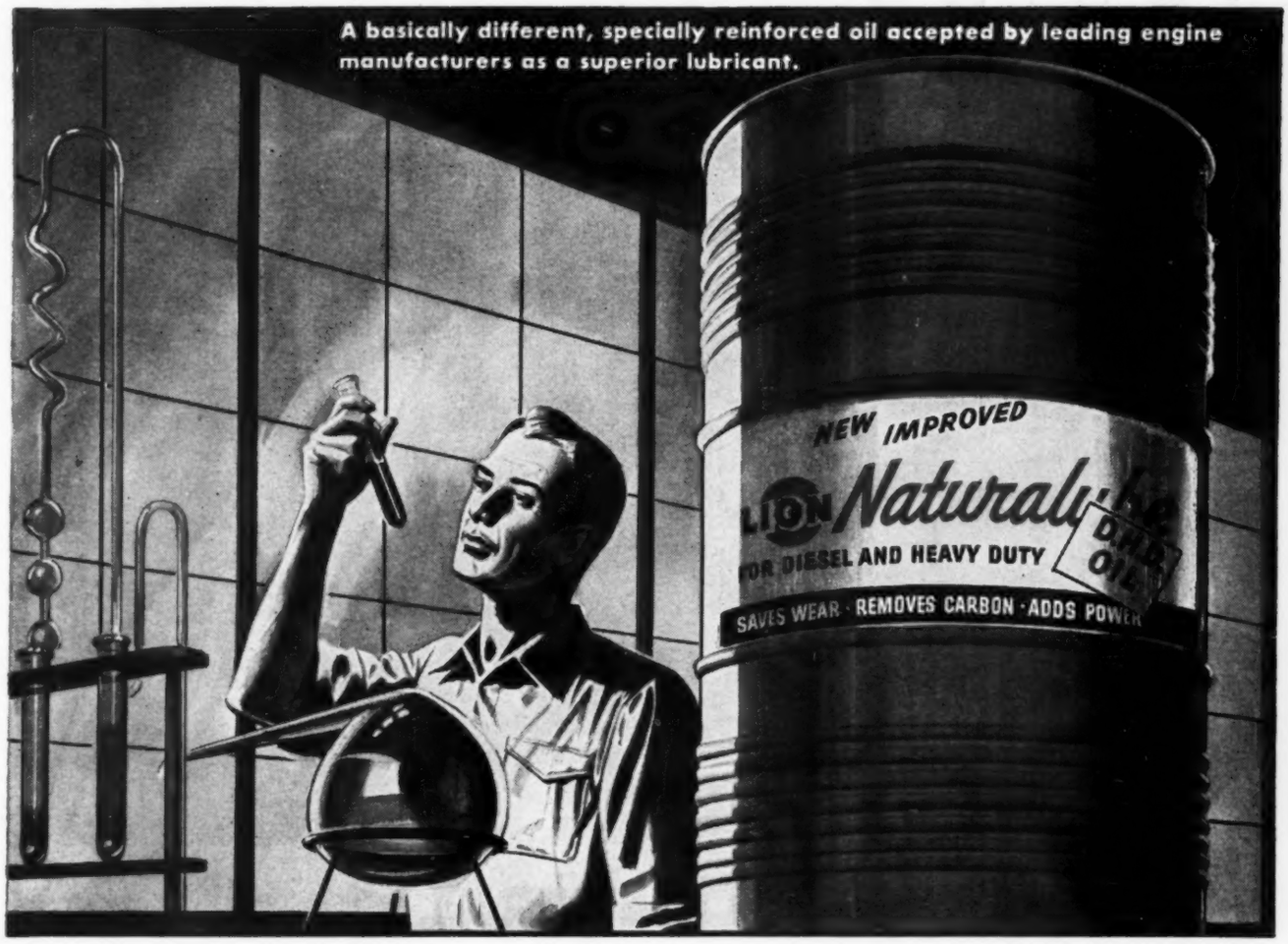


American Welded Wire Fabric has eminently served the ever-expanding field of reinforced concrete construction. Its closely and accurately spaced high strength steel wires of uniform quality — electrically welded into a prefabricated mat — provide the most effective and economical concrete reinforcement.

AMERICAN STEEL & WIRE COMPANY
USS
AMERICAN WELDED WIRE FABRIC
UNITED STATES STEEL

American Steel & Wire Company
Cleveland, Chicago and New York
Columbia Steel Company, San Francisco,
Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company, Birmingham
Southern Distributors
United States Steel Export Company, New York

UNITED STATES STEEL



RESISTS SLUDGE FORMATION
REMOVES HARD CARBON
REDUCES WEAR

Nature and science combine to make Naturalube D. H. D. the finest oil you've ever used, for special Lion processing of this basically different crude oil provides extra resistance to the formation of sludge and lacquer—the effects of heat and oxidation.

From Nature, Naturalube D.H.D. gets a tougher protective film... natural solvent properties that enable it to remove hard carbon... greater ability to *penetrate* to all moving parts of an engine and *adhere* to those parts even when engines are idle... and non-corrosiveness.

Ask your local Naturalube distributor about D. H. D. or write direct to Lion Oil Company, El Dorado, Arkansas.

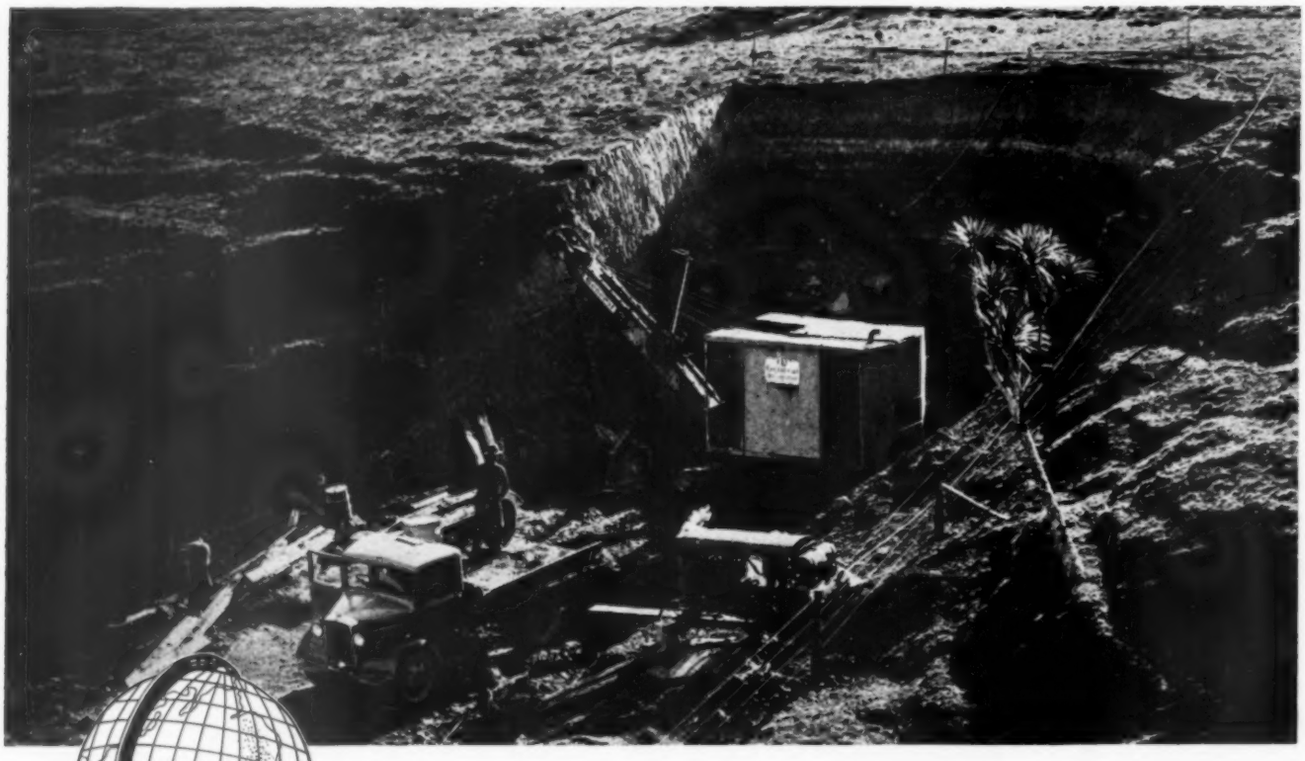
Naturalube D. H. D. is supported by a positive money-back guarantee of satisfaction. If you don't believe it is the best oil you've ever used, Lion Oil Company will return your money.

For normal service, where D. H. D. is not required, use Naturalube Motor Oil (not so heavily reinforced).

LION PETROLEUM PRODUCTS

LION OIL COMPANY EL DORADO ARKANSAS

DIGGING IN *"Down Under"* ...



With a GENERAL!

It's not surprising to find this veteran General shovel still turning in a full day's work every day, because 98% of all the Generals ever built are still in service. This particular General is shown at work on the Auckland-Warkworth Highway "down under" in New Zealand.

Such world-wide usage is evidence of the confidence construction and excavating engineers place in General-built equipment; confidence that is repaid by years of dependable, economical service. General's record of performance on the toughest construction jobs all over the world is a matter that deserves your serious consideration when planning to purchase new equipment.

Write today for complete information that points out how design, materials and precision construction are teamed up to provide General's built-in serviceability, its ability to do more work at less cost. And, if you'd like to know what's new in construction equipment, ask your nearest Distributor for details about the amazing new General Type 10—Model 105—the all-purpose rig, one-man operated, one-engine powered and mounted on pneumatic tires!

THE OSGOOD COMPANY
SHOVELS, DRAGLINES
CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC

Associated with The Osgood Company

GENERAL EXCAVATOR CO.
CRANES-SHOVELS MARION OHIO U.S.A. GENERAL OSGOOD
MARION, OHIO

GENERAL
CRANES, DRAGLINES
AND SHOVELS
DIESEL, GAS, ELECTRIC

You can't pass road mixes across the counter like sugar or salt, but certain unique features of KOTAL MASTER MIXES make it possible to handle them almost as easily as that.

KOTAL MASTER MIXES can be stockpiled ready for delivery in any quantity at any time, regardless of season or weather. That's a great convenience and a saving for plant, contractor and customer. Only the KOTAL Process makes this possible.

Let us tell you more about this important scientific development in the art of road building and maintenance. We'll gladly send free booklet to you—also the name of your nearest supplier.

MASTER MIXES KOTAL

KOTAL COMPANY
360-68 Springfield Ave. ★ Summit, N. J.

KOTAL *Master Mixes*

The Advanced All-Weather Aid in Building Better Roads

You can *stretch* Bridge dollars with Pressure-Treated Piles

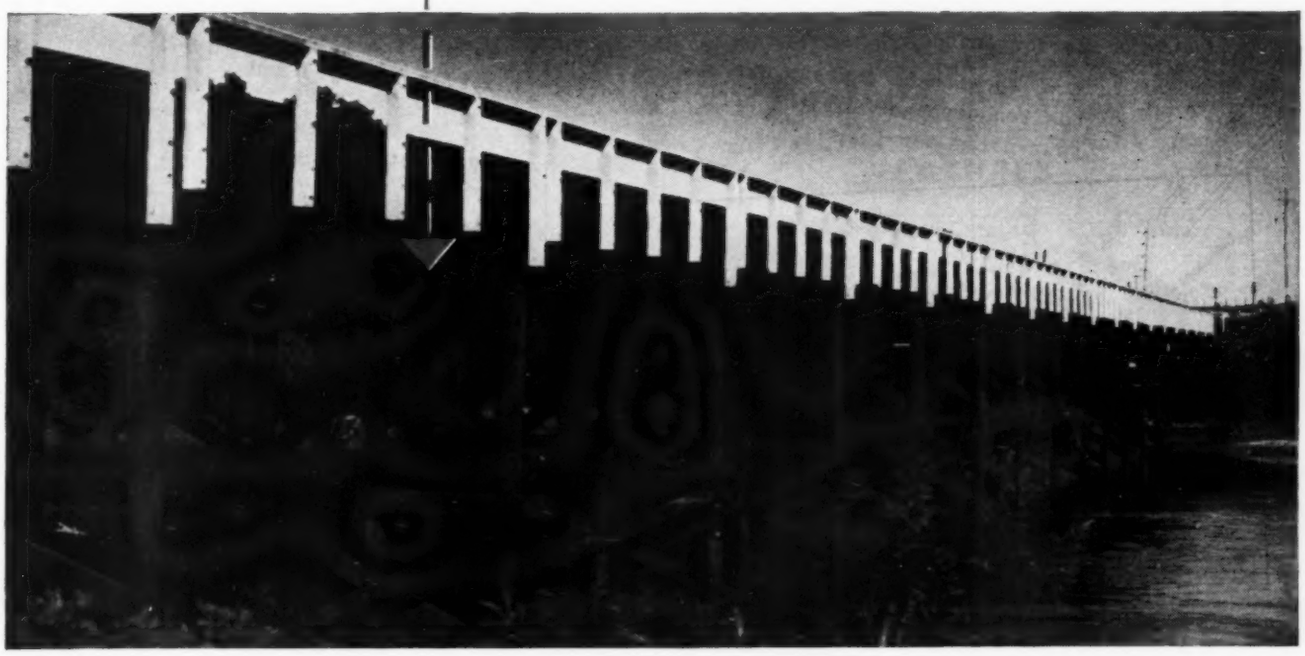
Many highway bridge projects were originally planned on the basis of pre-war costs . . . and a lot of highway departments are now finding out that today's dollars aren't big enough to do the job.

A good way to make these dollars stretch further is to build bridges like the one pictured. Pressure-treated piles provide an enduring support. First cost is low, and future maintenance is held to a minimum.

In this bridge six piles were used per bent. They were driven through a sand bed, and into the underlying shale. Because of their height, a double system of sway bracing was used.

Pressure-creosoted piles are important helps in large masonry bridges, also. Many engineers use them for permanent foundations in the footings of piers and abutments. With Koppers treatment, cut-offs can be made above the water table, without the usual decay hazard. Cut-offs are well brushed with 3 coats of hot creosote and capped in concrete.

Our Bulletin G-24 will give you full information on various treatments, and illustrates some of the many applications where pressure-treated wood is saving for users. Ask for a complimentary copy. Koppers Company, Inc., Pittsburgh 19, Pa.



K
KOPPERS

PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC.

PITTSBURGH 19, PENNSYLVANIA

Supervisors:
B. F. MANSON
J. A. AMSLER
CLARENCE W. ARTHURS

J. A. AMSLER
Secretary-Treasurer

CORNPLANTER TOWNSHIP
ROAD DISTRICT

OIL CITY, PA.
April 27, 1946

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We are now using and have been continuously using for the past eighteen months, six days a week, this Mack seven-ton truck on the maintenance of forty-two miles of gravel, ash and earth roads. Sections of these roads get very deeply rutted as the frost goes out in the spring of the year, which tries out the quality and performance of a truck.

We wish to express our appreciation of the service this truck has rendered and for the efficient service received from you and your sales service.

Respectfully,

J. A. Amsler, Secretary

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Keep pace with progress. Make your new truck a Mack—economical, efficient; harder-working with a longer life!

Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, New York. Factory branches and dealers in all principal cities for service and parts.

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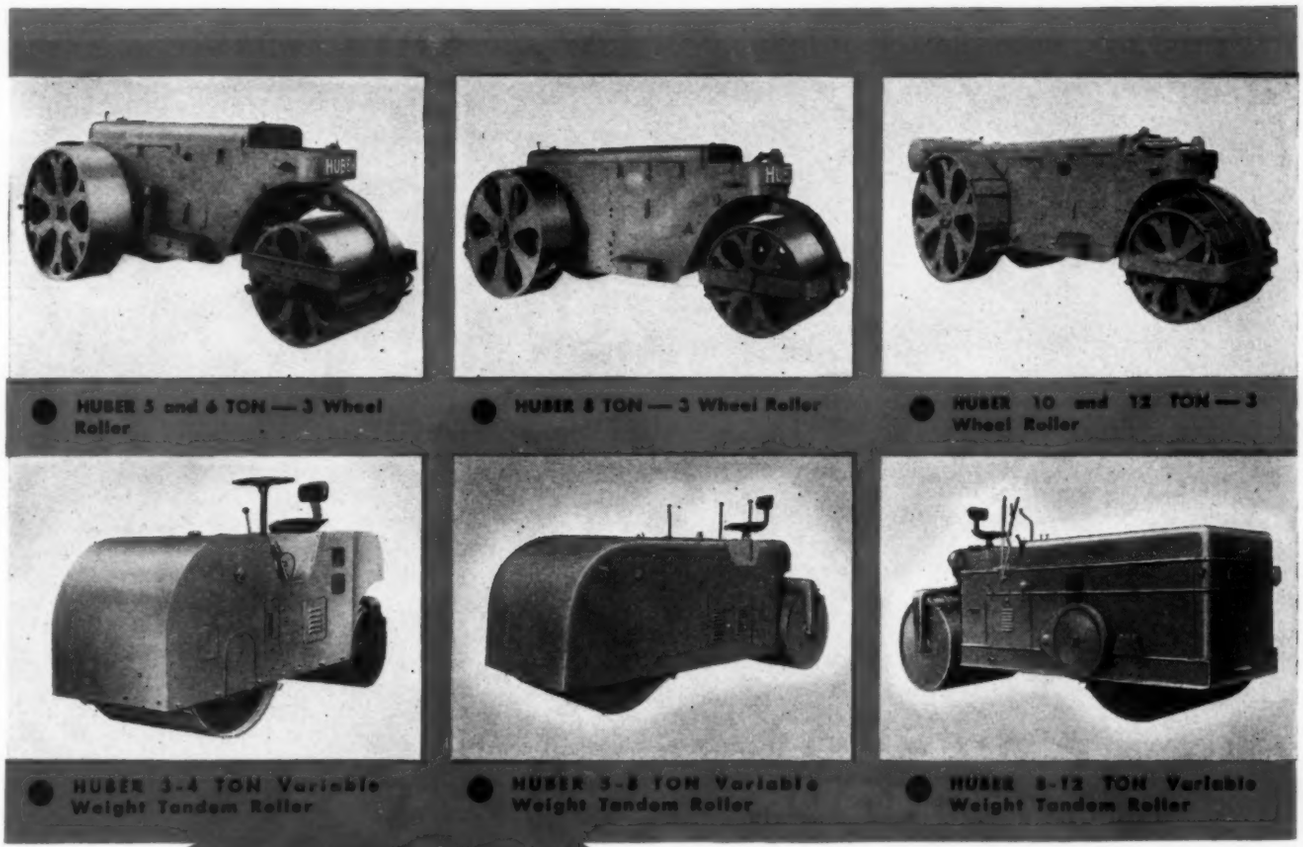

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MORE YARDS ARE MOVED ON

GOODYEAR

OFF-THE-ROAD TIRES

THAN ON ANY OTHER KIND!

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SURE-GRIP EARTH MOVER for maximum traction on drive wheels

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OCTOBER, 1946
VOL. 89, NO. 10

ROADS AND STREETS

★ Core shown is 18 in. thick, 40 in. in diameter and weighs about 1800 lb. Note heavy reinforcement mesh near top

The AAF's Proving Ground Airport

Recent developments at Eglin Field, where extremely high compaction and very heavy flexible and rigid runway pavement base has been provided for 300,000 lb. planes

EGLIN FIELD on the Gulf of Mexico, near Pensacola, Florida, is one of the Army Air Force Proving Ground Command's guinea pigs. The "now-it-can-be-told" happenings which took place there during the war played a tremendous part in our victory. Growing up like Topsy, this field was, at various stages, a resort town, gunnery school for Maxwell Field, rest camp for Army officers, a WPA airport project, and somewhat by accident turned into a highly important proving ground. Eglin Field's isolated location next to the gulf, plus its having a large percentage of time when ideal flying conditions prevail, made it a natural place for trying out all kinds of new wrinkles having to do with airplanes. It is the site of the Army's climatic hangar where every imaginable climatic condition, from polar blizzard to a steaming tropical jungle, can be duplicated.

The white sand, everywhere existent in this part of Florida, is a perfect A-3 soil, all of which passes the No. 10 sieve. Since an average of only 6% passes the 200 sieve, it is deficient in binder, but is very free draining.

Exacting Compaction Requirements

When the United States Engineer Office in Mobile was called upon to design runway pavements for 300,000 lb. gross loading, they included in the specifications some compaction requirements which made the southern contractors scratch their heads. 100% of modified AASHO maximum density for the top 2 ft. and an increase in density of at least 1 lb. per cu. ft. at depth of 6 ft. below pavement surface, but not less than 91% modified AASHO density, can be expected to become commonplace in airport construction, but it was advanced thinking when bids were taken in May, 1945.

Joint $3,777,390 Venture

The Smith Engineering and Construction Co., and the Noonan Construction Co., both of Pensacola, joined forces and submitted a low bid of $3,777,390 for the grading, paving, drainage and railroad construction. The larger contract items were:

Excavation	2,000,000 cu. yd.
18 in. concrete pavement	92,260 sq. yd.
10 in. concrete pavement	151,931 sq. yd.
6 in. sand asphalt (Road mix)	69,934 sq. yd.
4 in. emulsion sub-base	581,000 sq. yd.
Plant mix sand asphalt	262,225 tons
Asphaltic concrete	91,925 tons

The Smith Engineering and Construction Co., performed all of the grading, flexible pavement, and drainage. The Noonan Co. laid the concrete pavement.

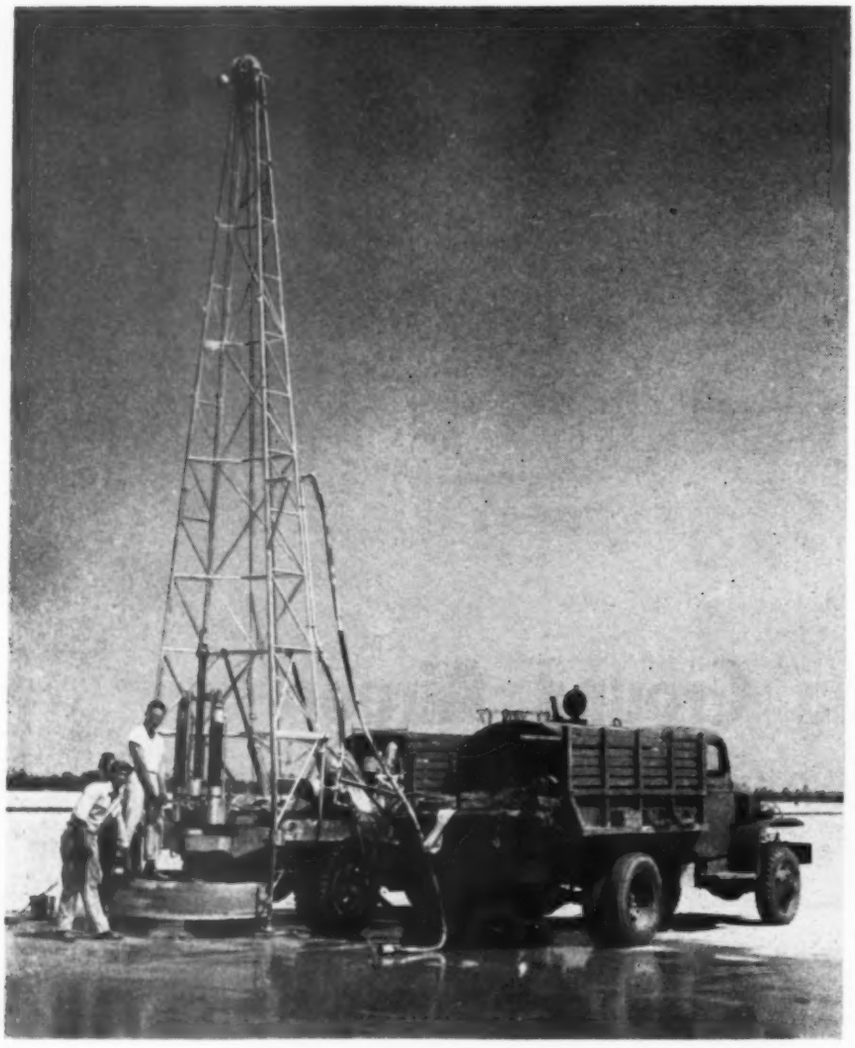
Excellent Compaction Results

One of the most noteworthy developments was the contractor's ability to use standard rubber-tired grading equipment to secure the high degree of compaction called for. While rollers were ineffective in the sand, the carefully planned routing of scrapers and pans over the work proved adequate except in one instance where it was necessary to use a loaded scraper as a supplementary roller.

Densities ranging from 102 to 104% were obtained in all fill sections. 100% was exceeded in the top 2 ft. of all cut sections and densities of 92 to 94% were obtained at 6 ft. below pavement surface. Wobbly-wheel rollers were used to knit together the surface for particular areas such as concrete pavement subgrade.

Flexible Type Runways

The airport runways, designed for 300,000-lb. aircraft, are laid on a 3-in. to 4-in. travel-plant emulsified asphalt-sand subbase. The sand asphalt base course design was predicated on results of the Marshall stability and flow test run on samples of local sand. This test was also used for construction control of sand asphalt mixes. The base course consists of



★ 40-in.-diameter cores were cut from concrete pavements to be sawed into flexural test beams. 10-in. pavement is being cored in this picture

three 3-in. layers of hot-plant-mix sand asphalt. The surface course at present is a total of 3 in. of hot asphaltic concrete, 1-½ in. of binder and 1-½ in. of surface course. This surface is considered adequate for 120,000-lb. gross loading. It is planned that 300,000-lb. aircraft can be accommodated by placing an additional 3 in. layer of asphaltic concrete. A bituminous tack coat was used between each layer and the pavement was given a bituminous seal coat.

Concrete Aprons

Aprons designed for 300,000-lb. aircraft were paved with concrete of 18 in. uniform thickness. A thickened edge design would have required a 23-18-18-23 section. To avoid difficulty with odd size forms, the uniform section was used and increased strength provided by triple ought 6 in. by 6 in. reinforcement mesh. This mesh was placed 3 in. from the top of all slabs and 3 in. from the bottom adjacent to all joints which would otherwise have been thickened.

Keyed longitudinal construction joints were spaced 25 ft. apart. The tops of these joints were given an asphalt seal (Detail A). Longitudinal expansion joints were spaced from 250 to 325 ft. apart.

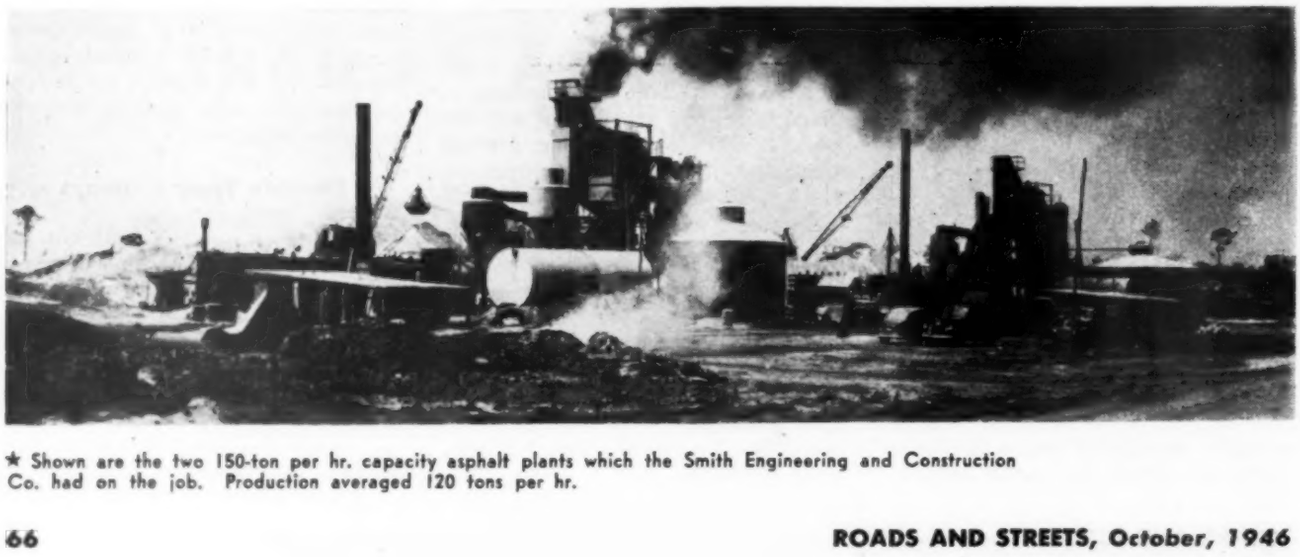
Transverse dummy groove joints were spaced 25 ft. apart and transverse expansion joints from 150 to 175 ft.

Washed local sands used as fine aggregate were found to be deficient in fines. This condition was corrected by an admixture of 3% crushed limestone (100% passing 80 sieve and 85% passing 200 sieve). As a result the flexural strength was increased by 100 lb. and workability greatly improved.

Slabs were concreted first to a 15-in. thickness, struck off and thoroughly vibrated. The reinforcement mesh was then placed, the top 3 in. poured and the concrete again vibrated prior to finishing. The concrete mix contained 75% portland and 25% slag cement. A surface-membrane type curing compound was used.

Conveyor Belt for Batching

The contractor's batch-plant aggregate bins were filled by a conveyor belt arrangement. The coarse and fine aggregates were stockpiled side by side over a long tunnel, the top of which was flush with the ground. Fine aggregates were piled on the ground over the tunnel closest to the bins and were separated from the coarse aggregates by a board wall. The walls of



★ Shown are the two 150-ton per hr. capacity asphalt plants which the Smith Engineering and Construction Co. had on the job. Production averaged 120 tons per hr.

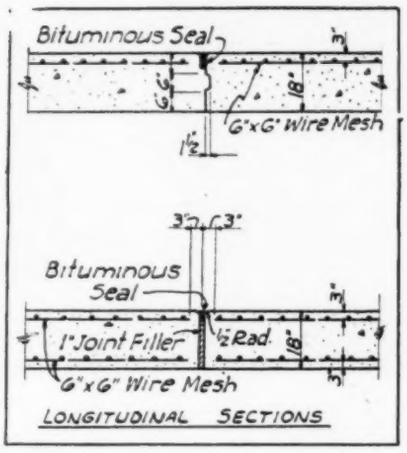
the tunnel were lined with 2-in. planking while the top was covered with precast concrete slabs. Square gates, as shown in the accompanying batch-plant photograph, could be opened or closed. When a gate was opened, it allowed the aggregate to fall through to a 14-in. conveyor belt. A switching arrangement at the bins allowed the belt to deliver the aggregates to the proper bins. Bulldozers piled aggregates over the gates.

Twin Asphalt Plants

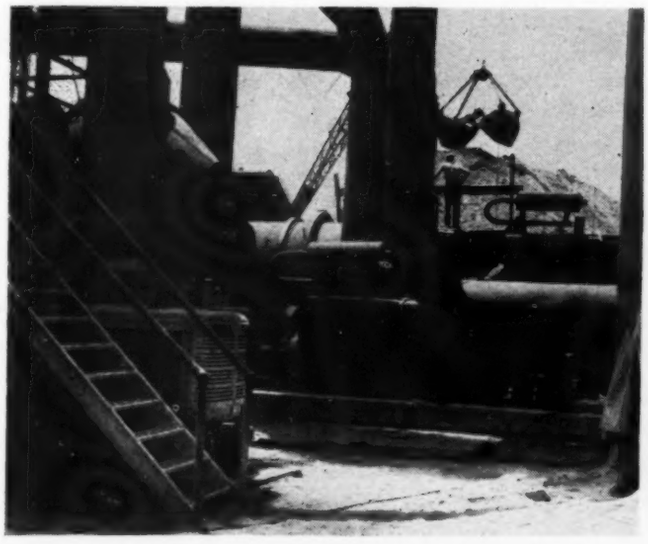
Second in interest only to the unusual pavement thickness was the very high capacity asphalt plant set-up the contractor had on the job. Twin plants, each equipped with dual driers, together had a capacity of 300 tons per hour and maintained an average of about 250 tons per hour day in and day out. Both plants were rigged so that they could be transported entirely by trucks.

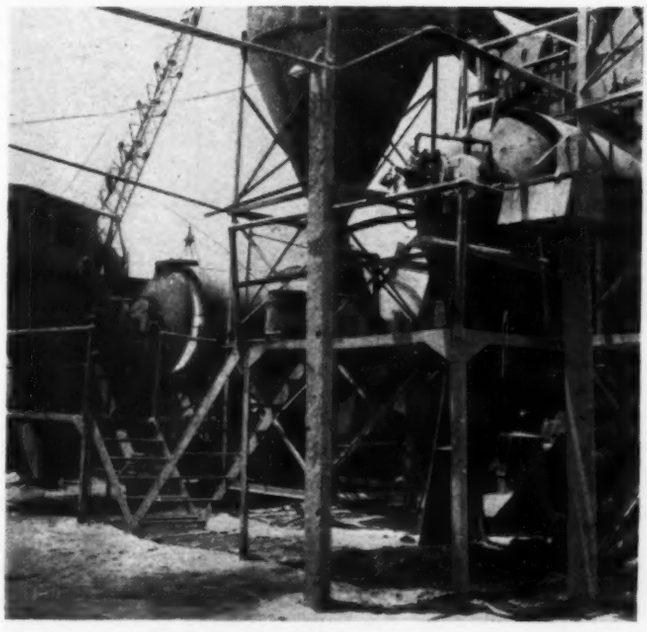
Aggregate Gradation Critical

Local sands were used for the sand-asphalt base course, and, as with the concrete, aggregate sources were deficient in fines. While fines were usually kept to about 8%, it was found that 11% produced a Marshall stability of 400 lb. The correct percentage of fines was found to be very critical and had to be controlled within plus or minus 1% to avoid pavement cracking and slipping. Each



★ Details of concrete paving joints



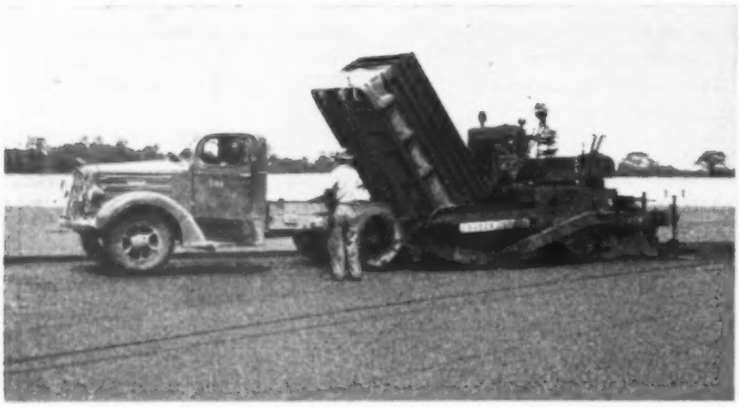


★ (Upper left): Portable power plants such as the three shown performed special jobs all over the plant

★ (Lower left): Dual oil-fired driers helped account for high plant capacity

★ (Upper right): Trucks delivered aggregate as high up on the stock pile as possible. Bulldozer then pushed it higher and also fed cranes

★ (Lower right): One diesel-electric generator supplied all current required

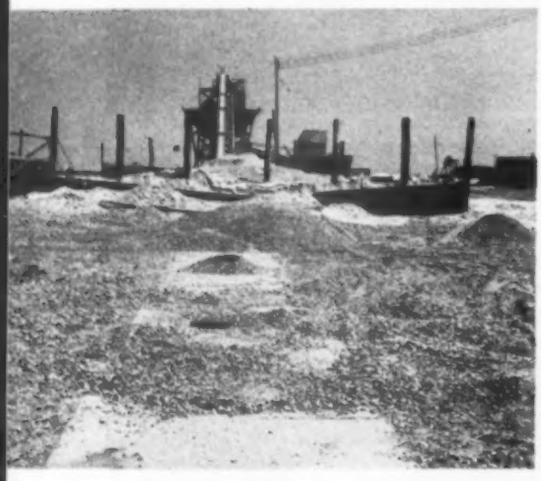


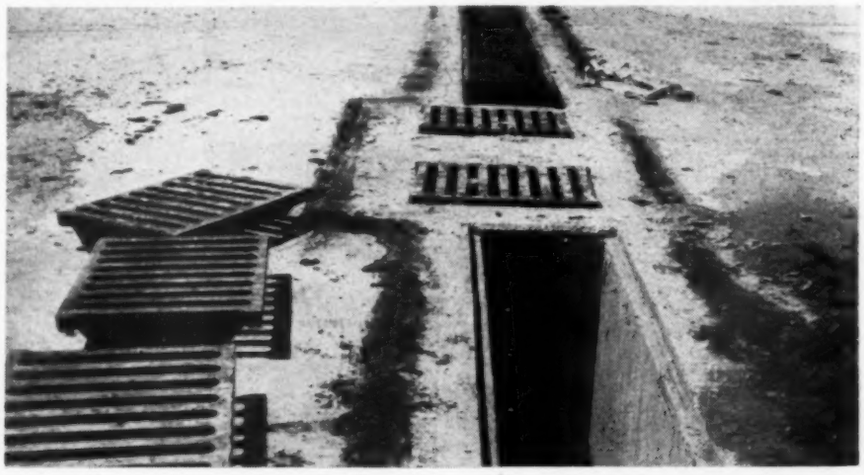
★ The contractor used several spreaders to handle output of dual asphalt plant

★ A conveyor belt was used to fill aggregate bins at concrete batch plant

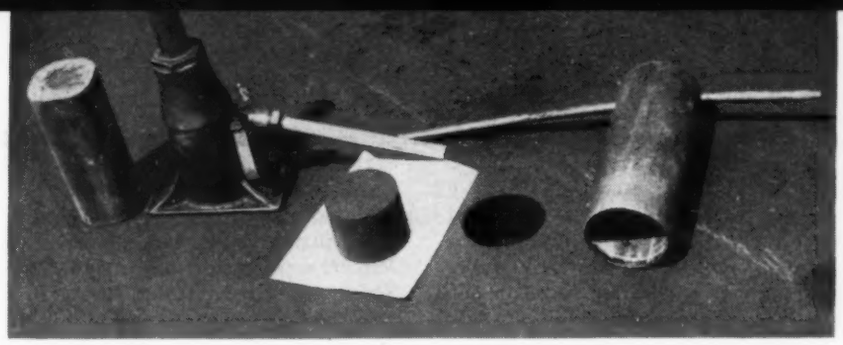
★ Flexible pavement was placed in 3-in. layers. Motor patrol is shown trimming edge of previous day's run, so that joint between runs will be perpendicular

★(Left): Pre-cast concrete slab cover over conveyor belt. Loading tunnel is shown with one of the inlet gates in the foreground. This gate is for coarse aggregates. The board fence separated coarse and fine aggregate stock pile. (Right): Grate-covered concrete box is used to carry off apron drainage





★ Airport roads were all mixed-in-place sand asphalt



★ Shown from left to right are wooden block for removing core from punch, hydraulic jack, pavement core, core hole, and punch fitted with handle for pulling punch

★ Size of core cut from 18 in. pavement is illustrated by 55 gal. drum used to mark location

plant was equipped with a 300-bbl.-capacity dust storage bin. It was also found that 4-½% asphalt gave better results than the normal 6 or 7%.

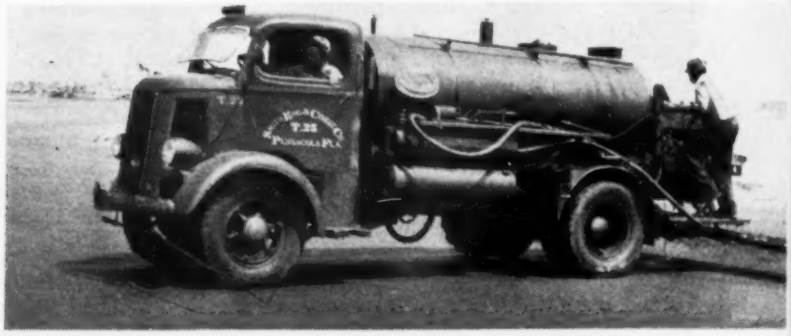
The contractor utilized several spreaders to handle the high plant output. One interesting feature was the use of both 10 ft. and 11 ft. spreaders so as to stagger the joints in the successive pavement layers.

To anyone who hasn't seen it before, the hole left by a 40-in. core in an 18-in. concrete pavement is a sight to behold. The core, which weighs about 1800 lb., was equally impressive as is shown in the accompanying photographs. These cores were shipped to a marble works where they were sawed into beams. The flexural strength of these beams was then compared with that of beams taken during construction.

After the core had been removed, extensive subgrade tests including plate bearing, "California" bearing ratio and field density were taken at each core location.

Construction control tests were performed in well-equipped concrete and asphalt laboratories on the job. The results obtained from cores punched out by the easy-to-perform method of coring asphalt pavements shown in the accompanying photographs indicate this method as being completely satisfactory from a technical standpoint.

★ Hydraulic jack and specially designed punch were used, with roller as load, to cut test cores in asphalt pavements



★ Distributors travelled at rather fast speed to hold tack coat application down to 0.07 gal. per sq. yd.

★ 300-bbl.-capacity dust bin, with truck in the foreground, loading refuse from asphalt plant at left of dust bin by dumping dust into hopper at base of bin

★ Close-up of maze of equipment involved in dual-drier asphalt plant. Smoke from twin plant is seen in the background.

Mixed-in-Place Roads

All airport roads are 6 in. in-place, sand mixed by a travel plant with about 6% of RC-1 (85-100 pen.). Sheeps foot rollers were found to be excellent for consolidating the road mix due to the kneading action obtained as the volatiles come out. The aerating effect of the sheeps foot roller also takes place as the density is building up.

Unpaved areas were planted to a mixture of Bermuda grass and Bahia grass. The Pensacola strain of a Texas variety of Bahia grass shows promise of producing an excellent turf.

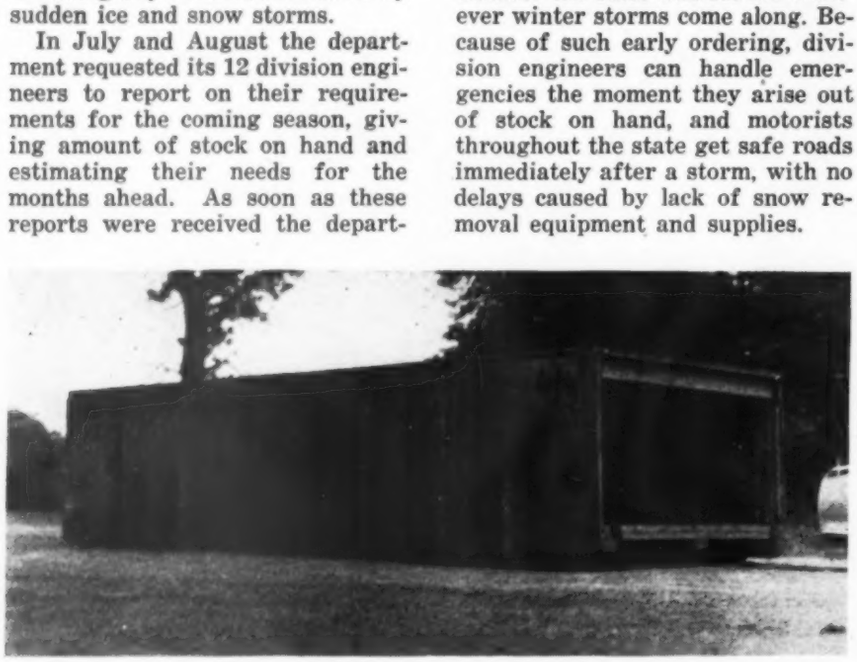
Personnel

Major George T. Littlefield, a former Louisiana Highway Department engineer, has had charge of the work ever since it assumed massive proportions. John C. Sims has served as his civilian assistant throughout. F. E. Mitchel was general superintendent for Smith and Noonan, and R. A. Britt was Noonan's superintendent on the concrete work.

Ohio Planned for Winter in August

Getting set for winter in August, the Ohio Department of Highways has worked out a system for storing rock salt that enables it to keep state roads safe for travel in spite of emergency situations created by sudden ice and snow storms.

In July and August the department requested its 12 division engineers to report on their requirements for the coming season, giving amount of stock on hand and estimating their needs for the months ahead. As soon as these reports were received the department prepared state-wide estimates and placed orders immediately for at least 75% of its winter requirements of rock salt. Deliveries were made as early as September, and by October the state was set for whatever winter storms come along. Because of such early ordering, division engineers can handle emergencies the moment they arise out of stock on hand, and motorists throughout the state get safe roads immediately after a storm, with no delays caused by lack of snow removal equipment and supplies.



In storing 75% of its winter rock salt needs, the state puts as much of it as possible indoors and the rest outside. Outside storage is a simple matter to arrange, for the salt is often just dumped on hard ground and covered with a tarpaulin, with very little loss from the weather.

To supplement its indoor storage space, the state recently bought surplus 20 to 25 ton storage boxes from the government. These are mounted on skids so that trucks can easily pull them from one point to another. They are set up along the highway and used for intermediate storage points; trucks can fill up from them and eliminate the need for doubling back to a central storage plant.

In addition to ordering rock salt early, Ohio engineers also check upon trucks, plows and other equipment in the fall to make sure that everything is in perfect working order to handle emergencies as they arise.

●

$30,000,000 Snow Bill

Thirty-six states spent $30,909,761 for snow removal and ice treatment during the 1944-45 winter, according to PRA figures, reports Charles M. Upham, Engineer-Manager, ARBA. The sum represents clearance of 288,999 miles of roads and involves the use of some 50,000 units of snow removal equipment.

●

★ (Above): Boxes like these measuring 4x7x17 ft. have been purchased by the Ohio department of highways to be used for rock salt storage this winter. They are mounted on skids so that trucks can pull them from one point to another. Use of central storage boxes of this kind will enable the department to remove ice and snow rapidly from the highways this winter. (Below): Two crates 3½x6x1½ ft. fastened together to make a rock salt storage box. Trucks can be loaded from it by hand or by a small conveyor hauled up to the open door

Cantilevered I-Beams

Support the Forms For Concrete Bridge Walk Replacement

New concrete walk brackets on both sides of bridge are tied together with reinforcing bars embedded in the new pavement. Visintine & Co., contractors, elected to use cantilever suspension of forms in place of usual falsework bents

LAST winter a section of cantilevered concrete sidewalk gave way on an old river bridge at Hamilton, Ohio, letting a pedestrian fall to the ice below. This failure precipitated the general replacement of sidewalks along both sides of the structure, which is a five-span earth-filled arch bridge about 500 ft. in length. Early in 1946 a contract was awarded to Visintine & Co., of Columbus for extensive repairs consisting of removal and reconstruction of sidewalk, sidewalk brackets, railing and other details.

The contractor was given the option of supporting his concrete forms on falsework, which was not to obstruct more than one river span at a time, or of any acceptable alternative. He chose to suspend the forms from I-beams cantilevering out over the work. After the old parapet and walk structure were cut away, falsework beams were placed in position blocked to the proper height, the inner ends being weighted with sandbags. Half of the roadway at a time was closed to traffic. This scheme proved highly efficient and economical for the purpose, according to state engineers in charge.

The condition of the existing bridge was investigated as fully as was possible without virtually tearing out all the walk portion.

★ General view of the bridge at Hamilton, Ohio, a section whose sidewalks gave way last winter. Old cantilevered walk structure shown stripped away

★ Reinforcing bars in the old sidewalk brackets were left anchored, and the original intention was to clean and straighten them and use them as most of the steel in the new concrete bracket beams

★ Completed walk bracket, ready for placing walk slab forms

Enough disintegration was found to exist to warrant replacing the entire walk and supporting bracket beams on both sides. New concrete construction was designed similar to the original except that a light open steel railing was included in place of the old solid masonry parapet.

The expectation was that the reinforcing bars exposed in cutting away the old bracket beams could be stripped, cleaned and straightened sufficiently for re-use, and that with the addition of another 1-in.-square bar, these bars would suffice to reinforce the new walk. The new walk, hence, like the old, would be reinforced by bars leading downward to anchorage in the arch wall.

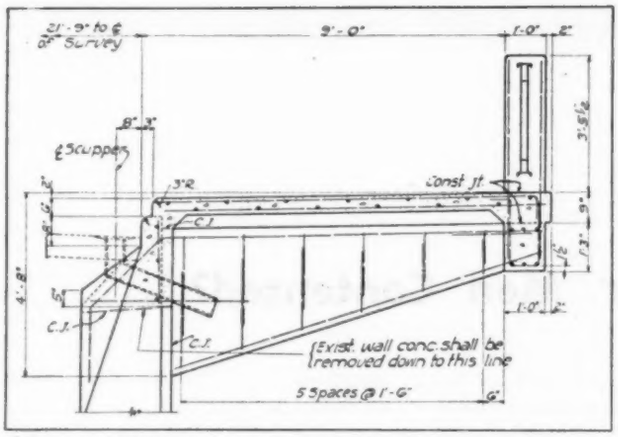
However, when the old concrete had been cut away it was found that additional support was necessary to carry the new sidewalk safely. So a design change was made,

★ In addition to the old exposed steel bars, however, new bars were placed, six to a beam, bars extending entirely across to the corresponding cantilevered beam on the other side

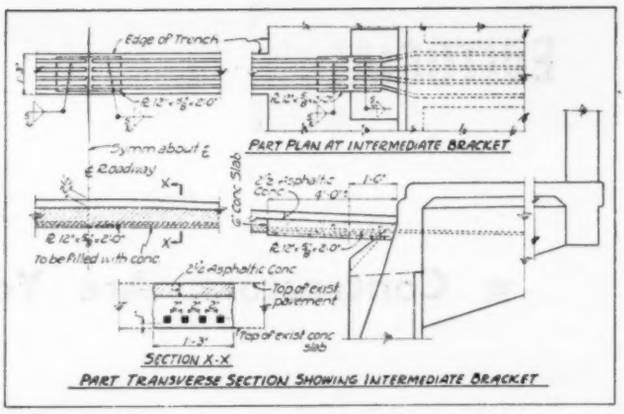
★ Another view of the new reinforcing bars, after casting the new bracket and curb, but before placing new concrete base for a bituminous wearing surface

★ I-beams cantilevered out, serving as a means of suspension for the bracket and walk forms, made river falsework unnecessary

★ Plank walkway for carpenters was suspended also



★ Fig. 1. Reinforcement scheme for brackets, as detailed before field change



★ Fig. 2. The reinforcing shown, in addition to the normal reinforcement shown in Fig. 1, was deemed necessary after preliminary cutting away of old concrete

providing for six new 1-in. sq. bars embedded horizontally in each bracket and extending transversely clear across the bridge. Bars, as shown in the drawing, were located at a level to avoid the three gas and water pressure pipe lines which run longitudinally across the bridge under the pavement.

The final plans called for placement of a 6-in. concrete pavement base in place of the old bituminous pavement in trenches across roadway at brackets. The contractor was required to maintain traffic over half of the bridge width. Because of this requirement it was not feasible to use bars extending continuously across both sides of the bridge. Instead the bars had to be spliced at the center of the bridge. In order to properly anchor or bond the bars for each side of the pour, and at the same time insure a thoroughly safe continuous system, bars were welded to steel plates at the centerline. A 6-in. splice sufficed across the weld plate.

CAA Opens 46 New District Offices To Handle Airport Plan

The opening of 44 new District Offices for the administration of the Federal Airport Program has been announced by T. P. Wright, Administrator of Civil Aeronautics; 43 are located in the U. S. and one in Puerto Rico. In addition, Airport Branches have been set up in the CAA Regional Offices in Honolulu, T. H., and Anchorage, Alaska.

Although some of the offices are located in temporary quarters until permanent office space can be arranged, all are in operation in anticipation of the flood of project requests for Federal aid under the Federal Airport Program. Project requests from states and communities are now being accepted for consideration by CAA District Offices.

CAA's Office of Airports made a careful study of proposed District Office sites before deciding on the locations. In some cases one office will serve as many as three states, while states with large areas, such as Texas and California, have two offices in each. This was done to serve the most communities from a central point.

Municipalities Urged to Submit Project Requests

Immediate filing of project requests with the CAA District Airport Engineers in the various states, by municipalities who desire Federal aid under the Federal Airport Act, is urged by Charles B. Donaldson, Assistant Administrator for Airports.

He stated that in order for applying agencies to get on the priority list for construction, which will start about April 1, 1947, project requests must be made as soon as possible. He warned that long delays in the submission of the project requests may mean that construction of badly needed airports may be put off until some later date in the 7-year program.

CAA engineers are now in the process of making a survey of the airport needs of the country. This survey is expected to be completed in December, and from this survey and the project requests, a national airport plan will be formulated. The priority list of essential projects for the fiscal year will be set up by CAA from the national plan.

Meetings Ahead

Highway Research Board — 26th Annual Meeting, at National Academy of Sciences and the National Research Council, Washington, D. C., Dec. 5-8.

●

Society of Experimental Stress Analysis — Hotel New Yorker, New York, N. Y., Dec. 9-11.

●

Southern Michigan Road Commissioners Assn. — Pantlind Hotel, Grand Rapids, Mich., Dec. 11-12.

●

Associated Pennsylvania Constructors — annual convention, Bellevue-Stratford Hotel, Philadelphia, Dec. 11-12.

●

American Association of State Highway Officials — annual meeting, Biltmore Hotel, Los Angeles, Dec. 17-20.

●

Associated General Contractors of America, Inc. — annual convention, Stevens Hotel, Chicago, Jan. 27-30.

●

American Road Builders Assn. — 44th annual convention, Palmer House, Chicago, Feb. 17-20.

●

Association of Highway Officials of North Atlantic States — annual meeting, Hotel Traymore, Atlantic City, N. J., Feb. 26-28.

●

Travel on rural roads in September climbed to an all-time high for that month, according to PRA figures. It exceeded the previous high (1941) by 2.7%, following a slight summer drop-off compared with that year. Estimated vehicle mileage for the month totaled 11,608,000,000 on the state highway systems. Largest gains were in the western states, where September traffic was up 27.7%.

EDITORIAL

★ Contractors: Are Your Men Contented?

There is another item from our friend, Roy MacGregor of the Constructors' Association of Western Pennsylanvia, whom we have taken to quoting often in these columns because of his sound observations. "Are your men contented?", he asks in a bulletin for Association members, which continues:

"All employers are interested in having men working for them who are contented and satisfied with their jobs, for they are usually the best workmen.

"The members of this Association are no exception, and contented, satisfied employees are just as valuable in our work as in any other.

"This note is brought about by the following circumstance which came to the attention of the office recently.

"One of our members called the Association for help recently in trying to locate a foreman, and as such a man was not available immediately he placed an advertisement in the Pittsburgh papers for what he wanted.

"He received a surprising number of replies and strange to say that a large proportion was from men now working for other members who wished to make a change. This then prompts the question — are your men contented?"

We prophesy more contentment in '47.

★ Private Enterprise and Roads

An editorial from American Road Builders Association

With memories of WPA wastefulness and incompetence lingering in the public mind, it would seem unnecessary to emphasize the advantages of the contract system over the force account system in highway structure. But with the nation about to enter upon the greatest road building program of all time — at least we have the plans and the money for it — it might be well to review why force account or man-with-a-shovel labor should be avoided.

This is specially true in the matter of secondary or farm-to-market roads. On the main or primary highways, the operation requires the equipment and know-how of an accredited highway contractor. But on country roads there exists in some localities the inclination to round up a road gang, collect what equipment may be had and start work on a catch-as-catch-can basis. Compare this method with the higher efficiency, longer lasting results and lower costs under the contract system. Here a man does the work who has studied the project and is willing to stake his money and his reputation on completion at a certain time and for a specified price. Private enterprise which involves competitive bidding, the posting of bonds and other regulations to insure responsibility is fundamental in the American way of living.

The objection sometimes given to the contract system on lesser roads is that the job isn't big enough to justify a contractor bidding. This is debatable. Many leading highway contractors today are adapting their equipment and developing new techniques for putting down all weather roads at the lowest cost per mile. That doesn't sound as though they were avoiding the small jobs. Then too, by grouping a number of small jobs into a single contract, the contractor is able to adjust his men and machines to the requirements of several projects to be carried at once or in sequence. This is a practical solution. It prohibits favoritism, extravagance, politics, delays and all the ills found under the force account plan. It protects the taxpayer's money and gives him a road that will stand up.

★ Illumination at Intersections

The grim figures on traffic deaths for the first half of this merry post-war year are with us, and, in spite of the definitely noticeable good national effect of the President's conference in May, it looks as though the 1946 total will be well up toward the all-time high of around forty thousand. This focuses attention anew on the things that engineers can do with modest expenditures without waiting for new construction.

High on the list are betterments at intersections. Channelization has gained headway and is one of the most potent means of reducing accidents at intersections, yes and other places where traffic dovetails or motorists tend to become confused. We believe that the Ohio state highway department's traffic engineers are thinking soundly, however, when they point to the need for some kind of illumination when rural intersections are channelized. Whether this takes the form of overhead lighting, floodlights near the ground, thoroughly reflectorized and over-size signs, or what, the fact is evident that motorists approaching in the dark often need more than their headlights to direct them through even a well channelized area that is unfamiliar to them.

Otherwise there will be hesitancy, dangerous stoppage in high-speed travel paths, or some other circumstance that may defeat the engineer's purpose. A subject worthy of more research.

★ Housing vs. Highway Maintenance

In Kentucky the other day a state highway maintenance garage serving sixteen counties burned. A petition for its reconstruction was turned down by the Civilian Production Administration.

After two applications and two appeals were rejected in Washington, state highway commissioner Watkins got warmed up and publicly wrote a letter of a kind we would like to see more of. "If the state highways of middle Kentucky break down for lack of maintenance," he wrote Housing Expediter Wilson Wyatt (also a Kentuckian), "you will have to assume the responsibility. It is difficult to understand the reasoning behind this action. Surely your executives realize that the very material that goes into veterans' housing must at some time be hauled over the highways. Unless our highway equipment is maintained, certainly the state system of highway transportation will break down."

Because it necessitates a 300-mile round trip to the next nearest shop for repairs by the state's old and parts-shy equipment fleet, this act of the bureaucrats deals a crippling blow to road work, Commissioner Watkins went on to explain. Yet the same Washington people didn't hold up distillery, theater and other building work in the same area.

It's a screwy world.

★ Build Bidding Confidence

We believe that one of the best ways for a highway department to be a good purchasing agent with public funds is to aim for the friendliest and frankest possible relationship with contractors. When neither party thinks the other has something up his sleeve, it's a better deal all around.

One southwestern highway official of our acquaintance ruminated on this subject the other day. Noting the common custom of cussing the contractor, he feels that this is certainly no time to over-sell the project. When a set of plans up for bids embodies difficulties that may not be obvious, he believes in seeing the bidder is fully aware of them. Contractors taken into confidence will bid with confidence, and a confident bid is usually a more reasonable one.

It's the uncertainty of many cost factors that has caused prices to go kiting and so many contractors to go fishing on letting days. There are enough uncertainties outside the plan sheets.

"Lay the plans on the table" and the contractor will do the best he can.

★ California Policy on Lighting

The California highway commission has taken another bull by the horns and enunciated a policy for highway lighting. Spurred to some kind of a decision by the costs involved on its large expressway projects, it has decided to light only those sections or spots where some unusual traffic safety problem is present. It will not undertake to install and operate general roadway lighting on extended sections of urban or other arterial routes. No special lighting funds will be sought, and lighting installations which comply with this policy will be financed out of road funds available for the road improvement.

The policy will resolve into lighting certain busy intersections and other points where traffic streams converge or where the motorist needs a special aid to vision. A particular case is in connection with channelization. Here and at other points of hazard or potential bewilderment of drivers, sodium vapor lights will be employed. And since this type of lighting will be confined to such points of special need, their presence will tend to alert the driver to a special circumstance calling for caution.

The policy will not hold back the fuller utilization of modern highway lighting, but rather work for it. Engineers are still working on such detailed design questions as light location and intensity, method of easing off into darkness, etc.

★ How Big Contract Sections?

How big should the parcels be in letting jobs? This question is ever up for discussion. The other day we heard of one highway department which has put the problem informally up to contractors. It was said that the contractors opined that half-million-dollar parcels would most likely draw the best bidding.

Now comes another kernel of information on the subject. In California, which, by the way, let over seventy million dollars in contracts the first ten months this year, contractors have offered the lowest unit bid prices on jobs running a million dollars or more. For example, a $2,900,000 contract was just awarded on the Bayshore highway near San Mateo, which drew seven bids, four below the estimate. News these days! Other examples could be quoted, including large projects calling for considerable bridge steel let at relatively low prices.

There's no mystery. In this cruel competitive world some of the biggest contractors came out of the war with a lot of fine modern equipment. Call it good management, "them as has gits," or what you will. They're in better position to roll than their small, poorly equipped brethren, observed one spokesman, and with better equipment, are able to bid lower and still come out.

Another factor is that of management costs, which along with move-in costs, are lower percentage wise.

★ Four graders worked as one squad, scarifying and reworking. They're busy here on a service road

State maintenance crew gangs up on urban arterial

Oil-Mix Resurface

IN DENVER, back in 1942, as part of the frenzied war program the Colorado state highway department built a 4-lane limited access highway out 6th Avenue to a large ordinance depot. Because of cost limitations and the uncertain long-term traffic needs, it was decided to use an oil-gravel road mix surface on a compacted granular base. Features of the project were reviewed in the October, 1943, issue of "Roads and Streets".

This surface, as was expected, took a terrific pounding under traffic that rose to a high peak three times daily at shift changes.

As a result it began to ravel, and ruts and corrugations were particularly noticeable at intersections due to stopping, turning and the added wear of cross traffic.

★ Another squad of graders, mixing oil. Note concrete curb separating the service lanes from express lanes

In order to forestall more serious damage and put surface back in condition for a still substantial volume of suburban traffic, it was decided to rework the oil mix surface completely, using readily available state maintentance equipment. About 3.5 miles of 4-lane express roadway, 48 ft. wide, and two flanking 2-lane service roads were included in the project.

The procedure was to scarify an area sufficient for one or two days of work, using heavy motor graders equipped with special scarifier teeth. A depth of about 3 in. was loosened. Two such grader squads worked simultaneously on adjoining sections. Scarifying was followed by discing until the old material was thoroughly pul-

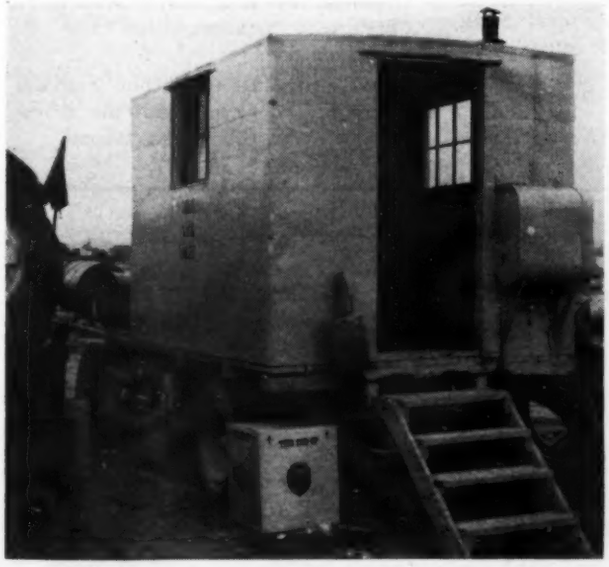
★ Grader operator checking his scarifying depth and nature of underlying material. The trick is to get down just to the bottom of the mat

★ Rooting up hardened bituminous gravel mat is plenty tough on scarifying teeth. Grader teeth were changed twice daily and fitted with new points

verized. The loose material was then turned over several times to dry it out, sweetened with about ½ gal. per sq. yd. of SC-3 asphalt, reworked, bladed out, and rolled into a 2-in. mat using a rubber-tired roller. The surface was sealed with .25 gal. of RC-4 and 20 to 25 lb. of 3/8-in. chips.

While the foregoing procedure is quite ordinary, not so was the push that the maintenance crew gave the job. Five graders worked on one section, and four graders on another, the usual procedure being to set up one or two blocks of length and so organize the operations that at least two lanes of the main 4-lane roadway would be open to traffic at any time. Sections of each service road were

★ Front-end loader cleaning up excess windrow material near an intersection



★ The state maintenance forces dropped the ladder of this neat supply and service truck at a temporary equipment yard adjoining the 6th Avenue project

★ Scarifying was followed by discing with this tractor-drawn outfit, seen trailer-mounted, ready for another assignment

★ A speedy and effective way to get compaction

entirely closed during the processing.

A tractor drawn disc harrow and a disc attachment on a grader did the pulverizing. One pneumatic roller proved to be enough for compaction when towed at relatively high speed behind a truck. One 3,000-gal. oil truck, two boosters, three dump trucks, and a front-end vertical loader for cleanup at intersections comprised the rest of the outfit. The entire job, comprising some 231,000 sq. yd., was completed in 41 days.

This resurface was completed at a total cost of about $32,000 according to state highway maintenance engineer D. N. Stewart. The cost of this type of operation on two-lane rural highways ranged from $1200 to $1500 before the war. Costs have practically doubled today, running as high as $3,000 per mile on ordinary secondary roads, which is comparable with the 6th Avenue job on a square yard basis.

●

New Uniform Terms Adopted for Wire Rope Centers or Cores

There is a trend on the part of the wire rope industry and the Federal Bureau of Standards to unify and adopt common terminology. Federal specifications have adopted these terms and have taken a leading part in using these terms and changes, notes a bulletin from the MacWhite Company which is adopting these terms and revising its catalogs.

In the accompanying illustration, four ropes are shown with the new terms applied.

Following are the terms and changes explained:

CENTER: This term formerly used indiscriminately to refer to the core of both wire rope and individual strands, now only refers to the *center of strands.*

CORE: This term formerly used loosely, to apply to the heart, center, or core of a wire rope or strand, now only applies to the core of a *wire rope.*

HEMP: This term loosely used for Hemp, Java, Manila, or other fiber cores is now dropped in favor of the word *"Fiber."*

FIBER: This term is adopted to refer to any fiber cores or fiber centers that may be of Hemp, Java, Sisal, Manila, Jute, Cotton, or other non-metallic material.

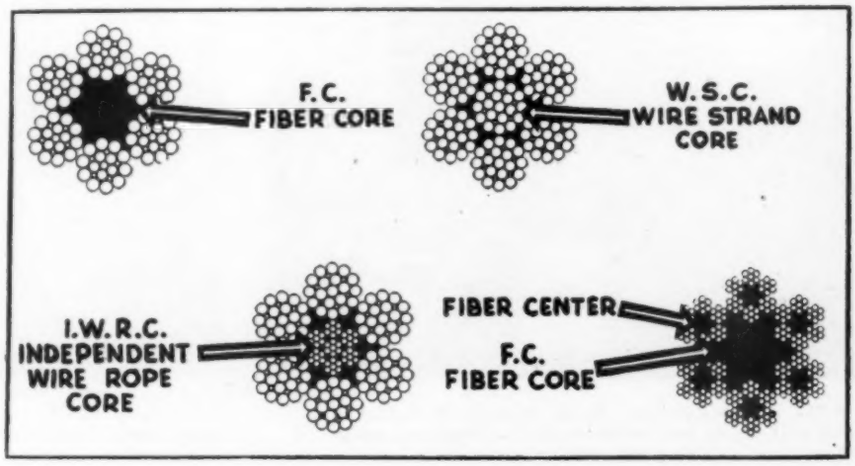
For Example.

"Hemp Center" in a *Wire Rope* now becomes "Fiber Core," with the abbreviation "F. C.".

"Hemp Center" in a *Strand* now becomes "Fiber Center".

"Independent Wire Rope Center" now becomes "Independent Wire Rope Core", with the abbreviation "I. W. R. C." retained.

"Wire Strand Center" now becomes "Wire Strand Core," with the abbreviation "W. S. C." being retained.



Open Steel Flooring Used on Pennsylvania Bridges

By L. A. Porter,

Bridge Engineer,
Pennsylvania Department of Highways

More than 5000 bridges on the Pennsylvania State Highway System are decked with timber, consisting mainly of truss spans erected from 30 to 90 years ago and I-beam spans mostly erected since 1932.

Because of inability to get creosoted lumber in sufficient quantities to meet our requirements, a large proportion of timber decks are untreated lumber. The result has been an exceptionally high maintenance cost.

Due to unavailability of materials and the scarcity of labor, maintenance work during the war years was limited to absolute necessity. Consequently at the end of hostilities, we were confronted with the problem of replacing most of the timber decks on our timber decked bridges. Lumber of the grades suitable for bridge decking and lumber suitable for concrete forms is still unavailable in even comparatively small quantities due to its being preempted for housing construction.

We are, accordingly, redecking bridges with steel floorings. Where the strength of the structure is sufficient and no future relocation is contemplated we use a concrete filled steel flooring which requires no form work. Where the structure is incapable of carrying the extra weight of the concrete filled flooring or a future relocation is contemplated we use an open mesh steel flooring.

Current advantages of the steel floorings hence sum up as follows:

1. No lumber required.
2. Low maintenance costs.
3. Light weight.
4. Open steel flooring may be salvaged 100% and concrete steel flooring 90% for reuse when bridge is reconstructed.
5. Enables us to spread required bridge reconstruction over a longer period.
6. Because of the present inflated costs of concrete, these floors are more economical than reinforced concrete.

Public Works Congress

Notes on 52nd Annual Meeting, American Public Works Association, Fort Worth, Sept. 22-25

FORT WORTH, or "Cow Town", as they call it over in nearby Dallas, was full of city engineering people recently, on hand to attend the APWA annual meeting. Your editor sat in on most of the sessions. Following are some of the significant details.

Marking the close of a billion-dollar year of reconversion efforts and resumption of peacetime public improvements by America's cities, the Association's retiring president, Lloyd M. Johnson, Chicago, turned over the gavel to president-elect Samuel S. Baxter, Projects Engineer, Bureau of Engineering Surveys and Planning, Philadelphia. Other election details:

Vice-presidents. Edward J. Cleary, Executive Editor, Engineering News-Record, New York, N. Y.; James Morgan, Commissioner of Public Improvements, Birmingham, Ala.; M. W. Tatlock, consulting engineer, Ralph Z. Woolpert Co., Dayton, Ohio; Walter N. Frickstad, City Engineer, Oakland, Calif.

Treasurer: William A. Xanten, Supt., City Refuse Division, Washington, D. C.; Leland R. Gare, City Engr., Ecorse, Mich.; George M. Shepard, Chief Engr., Dept. of Public Works, St. Paul, Minn.; W. A. Bowes, Comr. of Public Works, Portland, Ore.; Lloyd M. Johnson, Comr. of Streets & Electricity, Chicago; W. O. Jones, Acting City Manager, Fort Worth, Tex.

Progress on expressways . . . financing and design of municipal airports . . . public works in relation to housing crisis . . . parking, accident prevention and other traffic problems . . . street maintenance and equipment — these were again foremost topics at meeting attended by 300 municipal engineers and public works officials

Staff Officers of GPWA at Chicago: Donald F. Herrick, Executive Director; Norman Hebden, Associate Director.

Fort Worth Expressways

Naturally the spotlight was turned on the ambitious civic plans of the host city, and W. O. Jones, in his dual capacity as acting city manager and chairman of the Association's local committee, outlined the Fort Worth program. This city, after failures of proposals for a joint airport development with nearby Dallas, is proceeding on its own. Independent of Love Field, former municipal airport taken over during the war, and two other military fields, the city is planning a new air terminal that will bid for air leadership in the Southwest. Over-all studies are in progress. A 2400- acre site is to be developed. Speedy and ultimately tremendous growth in air cargo is anticipated. In Mr. Jones' belief this form of transportation must be planned for immediately by cities which expect to stay in the fore. Fort Worth also plans five million dollars in new sewers, a large modern incinerator, new jail, amphitheater and other buildings, more recreational facilities and an expressway system that put this city out in front in the 300,000 to 500,000 population class.

The Fort Worth Expressway program was described in detail by E. C. Woodward, Engineer-Manager, Urban Expressways, Texas State Highway department. Culminating a study begun five years ago, the program now adopted under city-state-federal cooperation and approved by the voters, will include initially a 9-mile east-west route skirting the downtown district. A mile rimming the business center will be depressed.

Typical of solutions arrived at in other cities, the Fort Worth scheme subordinates the outer belt or by-pass, heralded a few years ago as the answer to metropolitan congestion. While a north by-pass has been provided for cross-state traffic connecting with a similar by-pass around Dallas, this route carries only a small fraction of the load that will eventually stream

★ At the banquet, recent Public Works Congress held at Fort Worth

over the new expressway system.

Typical of other expressway solutions, also, is the high initial cost faced in Fort Worth, observed Mr. Woodward. A ¾-mile depressed section along the skyscraper district, involving five over-crossing, ramps and modernized parallel streets as service roads, will cost $2,000,000.

Supports Central Commerce

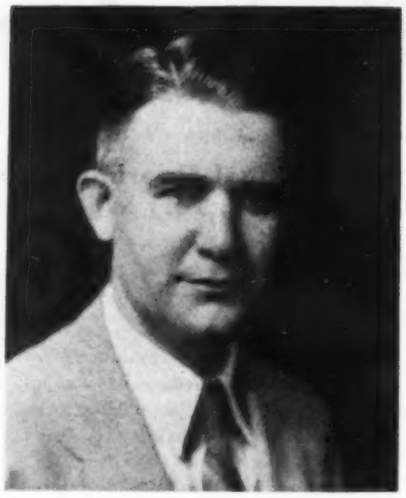
As with other Texas urban expressways those for Fort Worth are being designed from the center of the city outward, and the sections nearest the central business area will be given first priority because of greatest urgency of need. In outlining design principals Mr. Woodward observed that expressways must seek to support and strengthen the centralized business and shopping district, rather than foster decentralization. A city's commercial leadership usually lies in its ability to hold a trading area, and this in turn requires large mercantile establishments able to stock a more complete line than small-town or suburban shops. The highly developed heart of a large city, in turn, supports theaters, restaurants and other services which are trade magnets.

Expressway designers naturally must look to the development of better bus transit and parking facilities. Limited bus stops are a basic part of the Fort Worth plan.

Parking, in particular, is an orphan problem that is everywhere blighting downtown commerce. Curb and vacant lot parking is a makeshift solution, noted Woodward, and one of the great forward steps to be witnessed soon in American cities is the more aggressive development of off-street parking facilities. Municipal parking lots, eventually leased or otherwise turned over to private enterprise, are one solution. The cost of finding a solution may run high, but it will represent a sound and profitable investment.

Typical in a third respect is Fort Worth's use of low-assessment land for right-of-way. The city was fortunate in having a location for the expressways which was almost unanimously agreed upon as being economical in land cost as well as ideal for traffic needs. Right-of-way widths range from 284 ft. minimum to 369 ft. on the depressed sections.

Interchange design here has progressed far toward detailed plans, the guiding principle being to seek a simple solution that will not confuse drivers. While one full cloverleaf and several half-clovers have been included, Mr. Woodward and associates favor "directional" type schemes.



Samuel S. Baxter

Safety Needs Glamourizing

The need for finding a dramatic theme to spark the traffic safety campaign was voiced by Paul Blaisdell, Secretary, National Committee for Traffic Safety, Chicago. The very frequency of accidents destroys them as headline news, he pointed out. But other long-range campaigns, such as that on cancer and tuberculosis, have won the personal interest and support of millions through skillful dramatization.

In the case of traffic accidents, leaders have too often applied short-term educational and publicity methods to this long-term and continuing problem. An overdose of boresome preaching is the common fare, leading the breakfasting commuter to note over his coffee and newspaper that "Commissioner So and So is sounding off again", etc. Dramatic themes are difficult to find. Fact gathering must precede any attempt to revitalize local publicity.

Mr. Blaisdell lists several definite "road blocks" in present safety programs that must be removed:

Cost is one. Municipal budget makers are prone to cut out funds needed in fighting and planning for safety. Yet an almost entirely unnoted fact is that the economic cost of traffic accidents in this country annually exceeds 1-½ billion dollars — equal to the whole highway construction and maintenance program for a normal pre-war year! Short-sighted political leaders substitute less needed but more glamourized projects, to the neglect of safety which could be made the most glamorous of all.

Divided authority is another block. In most communities one sees from two to six public agencies wrangling over jurisdiction and dispersing their efforts. For example, the public works or engineering department on street design, police on enforcement (with perhaps a traffic bureau also in the picture), city council controlling street signs, and markers — all without a coordinating head or a real coordination program. This situation is the fault of a gradual accumulation of outmoded laws and governmental growth.

Commenting on the glamour side again, the speaker told of opinion polls that lift the curtain a bit on public attitudes and awareness of the safety problem. In answer to a question, "What would do the most good in reducing accidents", 31% of one sampling of citizens said, "Make people obey the laws." Another 30% said, "Education", and still another 30%, "Build modern cross-walks" (apparently in answer to some specific proposals). In other words, the three E's were about equally represented. On further questioning, 52% of this list of citizens expressed willingness to pay for more police, while 68% were willing to dig down for more "cross-walks", — thus revealing a belief that increased taxes would bring definitely better results if put into new facilities but that the police could probably do better through stricter enforcement without more personnel.

Airport Needs Worrying City Fathers

The breakfast meeting on airports, under chairman H. E. Beine, City Engineer of Gary, Indiana, was paced by Fort Worth City Manager Jones (see foregoing paragraphs). Dallas and Fort Worth, as a result of their inability to get together on a joint airport, face the penalty of staggered or skip-stop airplane service indefinitely.

The discussion soon veered to the problem of big planes, and the need for terminals equipped to handle transcontinental and trans-oceanic planes carrying 200 to 400 passengers. The B-36 is here, and other 200,000 to 300,000 lb. planes will soon be in flight, reminded O. J. Porter, soils expert and consulting engineering of Sacramento, and member of the Army's board of consultants on airfield design. Every major city must design for these planes.

Better Base Compaction

Porter, a leading exponent of the need for deep and heavy subgrade compaction, reminded that a 300,000-lb. wheel load is the equivalent of a column of concrete 4 x 4 ft. by 103 ft. high. He told briefly of current

simulated traffic tests in which 18-in. concrete slabs not having properly compacted subgrade failed under eight load passages. Better consolidation equipment and techniques are needed, and ahead of that a new appreciation of the seriousness of the runway load problem.

Recognition of this need is still the exception rather than the rule, and some of the big new fields are likely to be obsolete and will need strengthening, said Porter, who urged a new approach to site selection. The advent of big planes makes load carrying capacity a major cost factor, he pointed out. Fields must be located more frequently up off the valley floor, utilizing the well drained hill country rather than the black low-bearing-power soil of the valley bottom. Land cost is secondary, since it will cost $10,000 to $40,000 an acre to fill up a mud flat. It is cheaper to move the larger excavation yardages involved initially on hill sites, than to replace unsatisfactory soils to considerable depths, install elaborate drainage, design thicker pavements, and still pay the penalty of high continuing maintenance. He cited one instance where relocation of a site cut the construction cost of a proposed runaway from seven million down to one million dollars. A saving of a million dollars is frequently possible in re-studying the site problem.

Later, in a general session, Mr. Porter elaborated on this theme, saying that airport designers are now thinking in terms of 105 to 110% compaction, modified AASHO, with a soil density approaching that of concrete and high compaction carried down five to six feet by extremely intensive rolling. He prophesied that by 1951 we will have 250,000-lb. planes in regular commercial operation between large terminals. Pavement requirements, with deep subgrade compaction, call for 15 to 25 in. of concrete or from 12 in. (on ideal subgrade) up to 60 in. or more depth of flexible pavement (on clay).

Porter enumerated air terminals being planned abroad for world air commerce in such locations as Denmark, Cape Town (S. Africa), Brazil, Australia, and elsewhere at costs of 50 to 125 million dollars each.

APWA Airport Committee Report

Nathan L. Smith, Baltimore, chairman of the Association's airport committee, told briefly of Baltimore's airport plans which involve selection of an entirely new site since its old Municipal field turned back by the army cannot be enlarged. Financing is assured through $6,000,000 in bonds authorized by the state legislature. Voters will pass on the bonds in November.

Samuel S. Baxter of Philadelphia said that his city is providing for 300,000-lb. planes in current airfield construction. It has proved necessary to go down 5 ft. to compact in order to modernize a field area which heretofore has carried DC-3's and DC-4's without pavement distress.

Fields for Private Planes

What to do about fast-growing private flying was one of the chief airport topics at both the breakfast and the general session. Charles Ritchie, President, City Commission, Wichita, Kansas, said that his city, while having an excellent field for B-29 class planes, must do something eventually about the city's 4400 potentially licensed private flyers. The GI training program has stepped up this list. Service and hangar facilities must be provided, and he asks, "What is the proper way to go about it — local financing?" Present airfield facilities are now run for the benefit of the airlines, he observed, although local citizens are carrying the financial load.

Sacramento already has six fields for private planes, said another spokesman. Indianapolis, reported H. H. Morgan, Indiana Economic Council needs 22 such fields and now has six. Indiana's airfields have increased from 53 to 184 in two years. This speaker warned that commercial and private flying must be given separate facilities. The need to foster development of private flying and exert proper control was cited by George Shepard of St. Paul as one reason for creation of a metropolitan or regional airport commission. He described the features of the Metropolitan Airport Commission created to serve St. Paul and Minneapolis. This authority has jurisdiction over approval of new fields, coordinate airfield development in the area, and furnishing engineering service.

Some cities, it was noted, are getting CAA airports far in excess of present needs, thus letting themselves in for a serious upkeep problem.

Fewer Runways, Among New Concepts

In a talk on New Concepts in Airport Design, A. E. Dyatt, Chief Engineer, Airport Branch, CAA Fort Worth Region, also spoke of the inevitable obsolescence of many airfields, which like planes, are in a fluid state of development. The possibility of saving funds by confining more fields to one or two-directional runways was seen in the recent perfection of swivel landing gear for cross-wind landing of small aircraft. This speaker charted commercial aviation's recent sensational growth — from 3-1/5 to 6 billion passenger miles in one year; 2500 commercial planes now in use.

Big air terminals need better planned business facilities — a phase now beginning to get greater attention because of revenue possibilities. Passenger and cargo traffic must each have its segregated business area, he emphasized, although both can conveniently use the same runways.

Air terminals now require a minimum runway length of 8,000 ft. at sea level, with an 8,000 ft. runway in at least one direction desirable. Runways costs in the neighborhood of $100 per lineal foot should be anticipated.

Several types of layouts for private flying are taking form. One is the suburban field, rimmed by home lots whose owners will have individual hangars at the back of their homes, the homes facing out to a parallel street and the hangars opening onto the field. Runway lengths need to be 1800 ft. minimum plus clear zone approaches.

Housing a Factor in all Works Planning

Frank W. Herring, director, Land and Public Service Branch, National Housing Agency, Washington, talked on the public works aspect of the national housing program. New communities or land parcels to be opened up in the accelerated 1947 national program will represent 300 square miles of new subdivision land. This means new, enlarged or extended sewers, new schools, other public facilities. A billion dollars in such development aside from the cost of the homes themselves is forecast.

Many existing supply industries will be immediately overtaxed, and must face a new load; for example, a possible 50% stepping up in water pipe manufacture over present volume.

Street Maintenance Notes

The breakfast discussion on street cleaning and maintenance brought out several interesting bits. A. Davenport, Iowa, delegate told of changing from cut-backs to asphaltic cement (pen. 125-150) for gravel mixes in street repairs, in an effort to obviate stripping and reduce roll into gutters.

One large city's experience with a new municipally owned asphalt plant was reviewed by Henry W. Dawson, street commissioner of St. Louis. His 1000-ton plant is supplying crews on an extensive program to repair badly cracked asphaltic surfaces. Two force-account outfits have worked steadily

to seal streets with MC-5, which was adopted as an improvement over RC-3, which had also been considered good. A shortage of pea gravel due to heavy cement block demand for housing has hampered the work. Best cover material is gravel of 1/4-in. max. with 15% sand. The MC-5 fills cracks and holds this cover well. Ten-ton rollers are used in absence of lighter rollers.

Downtown St. Louis business streets are sealed under contract, the contractors using small emulsion patch tanks which can be taken around with least traffic interference. MC-5 treatment is bought "in-place", current price about 12 cents a square yard. St. Louis formerly patched concrete and brick streets with the original types of materials, but has turned to bituminous patching to save labor. Treatment by city forces (and city accounting) has cost 6-1/2 cents per sq. yd. with 1/3 gal. MC-5 and 20 lb. sand.

Preheating of sand cover in surface heating streets, as a possible means of reducing whip-off, came in for discussion. This method was used in Kansas City, for a time on gravel cover, but this city has gone back to Joplin chats, and now uses an additive to prevent stripping. Anti-stripping materials are reported successful here except when applied under extremely wet conditions. Moisture in cover material is not now considered a problem. Kansas City's treatment consists of .25 gal. of 150-200 pen. asphalt and 17 lb. of cover. Current prices in place are running about 8 1/4 cents for asphalt and $2.78 per ton for cover, or about 6.1 cents per sq. yd. for the finished job. A contract clause requires the contractor to maintain the street until it has taken all the cover that will stay on.

A Superior, Wis., delegate endorsed the effectiveness of an anti-stripping compound used.

Fort Worth's gravel street treatment program was described by H. H. Hester, street superintendent. A double and sometimes triple "shot course" is his answer to offset growing traffic. Used to date on about 200 miles of streets (see R and S, March, 1945), the procedure is to put down a course of low-P.I. material and maintain it through a winter. Then in the spring .4 and 35 gal. of 90-100 material is applied, and often a third course, each with rolled gravel cover, in an effort to stem the rising tide of maintenance.

Permanent type streets needing resurfacing are also being paid for now on a 50-50 assessment basis in Fort Worth, and contractors have been active in working up petitions.

★ Outgoing President Lloyd M. Johnson (Chicago) greeting Fort Worth's City Manager W. O. Jones

On the question of financing street repairs, listeners were told of the current bond election in Kansas City which will make $6,000,000 available. A raise in the present 1-cent city gas tax is contemplated.

One delegate took cities to task generally for letting streets get out of hand during the war under the excuse that men and materials were short. St. Louis was able to come out of the war with well kept streets due to good municipal financing, it was cited as an example. The merger of St. Louis city and county, which has aided finances, was given as a contributing factor. St. Louis can resurface streets with general funds.

Pavement Cuts

Pavement cuts continue to be a serious detail of street administration. St. Louis spends $40,000 annually on cuts. Kansas City has a new ordinance under which the city takes over backfilling, as a means of insuring proper compaction. The city men move in as soon as the inspector has O.K.'d the utility connection; backfilling cost is charged to the householder on the plumber's bill.

Fort Worth streets have had 1510 openings thus far this year, double the 1945 rate.

Davenport has long done its own backfilling and patching. Contractors must notify the city before 9 a.m. of the day of work. Power tamping in summer and sand filling in winter is the rule; no puddling.

Bus Stops

Resurfacing of zone areas along abandoned street car tracks continues to be a problem. In St. Louis $650,000 has been put in escrow for such work. Discussion on the subject quickly led to the problem of paving bus stops. Concrete seems to have unanimous acceptance for bus stops, 10 ft. by 40 to 50 ft. areas being commonly provided. Heavily reinforced concrete has stood up well for 13 years in St. Louis. Wichita has found it necessary to pave a continuous bus-strip along downtown streets. Some cities have lacked the ordinance detail needed to force bus companies to use the stops provided.

The problem of getting away from cheap high-maintenance type streets in assessment programs also came up. Dallas, which has a large resurface program, has found it hard to sell property owners on the higher initial cost. Triple surface treatment in this region which formerly cost only $6.50 per 50-ft. lot, now costs $16.50. In Kansas City the policy is to make property owners pave durably or not at all, permits being refused except for permanent type pavements.

It was pointed out that the city engineers generally have been spoiling property owners by doing too good a job of periodic surface treatment with city funds.

Who pays for maintenance of the car track zone when trolleys go to rubber tired buses? In Knoxville the bus company pays a seat tax into general funds, which reach street improvements. Des Moines during an almost complete change-over from rail cars has seen the gas trolleys cause widespread street damage. A present tax of 2 3/4% of gross revenues and $65 each per bus brings only about 25,000 annually. An engineering committee is presently studying the question of a fair tax method, and a master and spot-count traffic census of all vehicle traffic is to be made as a means of determining the relationship between bus and general traffic use of specific routes.

Public Works Planning

Progress in public works planning nationally was reviewed by George H. Fields, Commissioner of Public Facilities, FWA. Federal advance planning funds have been advanced to 2200 public bodies, two-thirds being smaller communities. While an impressive total of local financing is tallied, most of it comes from New York state. However, by summer 1947 we should have four billion dollars in projects blueprinted, or about a normal year's work.

In commenting on the current slowness in public works, Mr. Fields observed that we are suffering from the fact that the building contracting industry has had to rebuild from a depressed level of work reached late in the war. He said that voters currently are in a good mood to approve plans and financing for future work, and now is the time to get plans before them.

Kenneth K. King, Director of Public Works, Kansas City, Mo., reviewed

his city's 5-year program, which is the initial phase of a long-range city plan. He counseled to avoid springing huge cost estimates on the public, tending to "scare taxpayers to death."

New Equipment Needs

The luncheon session on new equipment was a somewhat rambling affair, having the central theme that equipment problems are worse today than during the war. Brief comment yielded several notebook items, such as:

Garbage trucks — Need for wider and larger cab that will house crew of four instead of two or three.

Leaf collectors — Will equipment manufacturers soon be giving us anything new? Several examples of adaptation of equipment were cited. Montclair, N. J., has used a Snogo, which works fine on dry leaves, saving $13,000 annually. A broom attachment pushes leaves into piles for speedier loading. City Engineer Sandenberg of Ann Arbor has built a blower, utilizing a Ford engine, which packs leaves away in a truck after pick-up by a small grader blade.

Trucks — Due to non-availability of new trucks, why not consider more efficient and steadier use of present ones?

Snow equipment — Sidewalk plow types and sizes were inconclusively discussed, as was use of special blades for ice removal, spring belting behind V-plows for getting the last one inch of packed snow, possibility of a power broom on the plow for the same purpose.

War surplus equipment — Among other things, example of adaptation of civilian defense pump units as street flushers. Little surplus equipment is coming along.

How to get better use out of present over-age equipment was summarized by the APWA committee on equipment. Some of the points: Reduce time-loss by regular check-in. Install better dispatching and control office procedure. Plan 2 or 3 shift operation. Build up better parts stock. Keep old units for fill-in service. Standardize (in future) on fewer types and makes.

Among design wants voiced to manufacturers: simpler, sturdier designs, heavier fenders especially, shorter turning radius for greater maneuverability. The committee was asked to consider uniform specifications which Association members could use to compare equipment values offered and force greater standardization on quality and mechanical details.

Safer Street Lighting

Editorial in Fort Worth Star-Telegram, published on opening day of recent 52nd annual Public Works Congress

American cities are coming to realize that better street lighting means greater safety — for motorists and pedestrians. Accordingly, many of them are planning, and some actually have started, the replacement of antiquated inadequate street lighting systems with modern illumination calculated to increase traffic safety. This does not always mean the installation of expensive new types of lighting, but better placement, mounting and direction of lights so as to aid vision rather than to hinder it, as is now too often the case.

The relation between adequate lighting and traffic safety was brought strongly to attention by the wartime dimouts in coastal cities and brownouts in inland cities. Reduced street illumination during that period was blamed for a tremendous increase in the number of traffic accidents. But nationwide safety records show that even before the war two-thirds of the traffic fatalities occurred at night, when traffic volume was only one-third that of daytime.

Buffalo, N. Y., has been spurred into relighting all its most heavily traveled thoroughfares by a postwar survey showing that 79% of traffic fatalities in that city during the last five years have occurred at night on dimly lighted streets. In Connecticut, 134 pedestrians were killed in traffic accidents last year, 94 of them at night. Only three of the fatalities, according to a report by the Connecticut Highway Safety Commission, occurred on well-lighted streets. Police officials throughout the country have pointed out that crime, as well as traffic dangers, lurks in the shadows of poorly lighted streets. They attributed 43% of the crimes in their cities to inadequate street lighting, with 72% reporting that they considered their own city streets insufficiently illuminated.

Although high costs and shortages of necessary materials are deterrents to immediate improvement of these conditions, cities profitably could devote time to determining where their lighting systems, many of which were installed years ago when less was known about the best methods of lighting, fail to measure up.

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Aerial Map Program for New York State

The New York State Department of Public Works is acting to speed up its planning of new highways by employing on a broader scale than ever before the most advanced techniques of aerial surveying developed during the war. Charles H. Sells, State Superintendent of Public Works, recently received bids for making aerial surveys, topographic maps, photographic mosaic maps and other work covering about 105 square miles at widely scattered locations. The aerial surveys were scheduled for completion before winter of this year. They will be used to facilitate the location and design of eight projects including highways, thruways and urban arterial routes.

Subway Parking Lot for Detroit Soon

According to a newspaper item, plans for a parking area underground in downtown Detroit are nearing the stage where a launching date can be set. Architects' plans have been approved by the city plan commission. The garage will be under-written by bonds approved a year ago by Detroit voters. Revenue bonds will be brought before the council for approval soon, commissioner of public works was quoted as saying.

The proposed lot, to cost about three million dollars, will house 900 vehicles at a time. Patterned after the underground facility at San Francisco the parking area will be for storage only, with no provision for car servicing. Double this size of garage is needed, according to Mr. Richards, who believes that servicing facilities are needed to insure that the city project will become fully self liquidating.

Whether to have attendants, or self parking, is also a live question. It is said that San Francisco has had large claims due to auto damage allegedly caused by parking attendants.

●

Highway Toll Facilities in U. S. — There were 6 toll tunnels, 561 toll ferries, 25 toll roads and 240 toll bridges in the United States in 1940. Over all these facilities in that year passed 904,565 vehicles a day or about 33 million vehicle trips a year.

URBAN THROUGH ROUTE PLANNING

I. Urban Highways and the Interstate System

These two papers, presented at the 3rd Annual Connecticut Traffic Engineering Conference under the Yale Bureau of Highway Traffic, describe problems in Connecticut and one of its principal cities, and give steps taken and conclusions of wide interest

By Roy E. Jorgensen

Director of Highway Planning
Connecticut State Highway Department

IT HAS been shown by origin and destination studies all over the country that our main highways are not the "through" routes we used to think they were. Highway planners are now using information on trip movements to develop locations which will serve the traffic, regardless of the ultimate terminus of the designated route. With the possible exception of our very largest cities, the studies show the major traffic movements are into and out of the city centers; hence, that is where the routes are being planned.

In Connecticut the planning of US 6 is a good example of planning to fit traffic rather than existing "through" routings. A study of US 6 in the Waterbury area, made two years ago, led to development of a plan for a major improvement into and through the city, in place of continuing to develop the existing routing which goes some distance north of the city.

Since our first studies in the lower Naugatuck Valley and in the Waterbury area, we have continued in Connecticut to develop our programs for major improvements on the basis of traffic origins and destinations. However, we have seen the necessity for careful interrelation of projected routes with other improvements both inside and outside the urban areas. For example, in our Waterbury study for an east-west route, it became necessary to provide for the possibility of an eventual major north-south route. Likewise, in our planning for the relocation of US 6 to route it through the city, it was necessary to consider how such a routing would fit east and west outside of the city. In fact, it was necessary to develop the Waterbury Study and the study we made in the Hartford area in close coordination as, in the end, Route 6 will be on a new routing all the way from Waterbury to Hartford.

City as Traffic Center

Origin and destination data provide convincing evidence of the basic importance of cities in the generation of highway traffic. This importance is recognized by two steps being taken under the Federal Highway Act of 1944 (earmarking of funds for expenditure on urban portions of the Federal-aid system, and the designation of a National System of Interstate Highway). The Interstate System, which will be the top priority Federal-aid Highway System, is aimed at connecting the principal urban centers of the country. The Act states that the system shall be "so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers . . . ."

The Federal Highway Act of 1944 provided that the system would be designated jointly by the states. The map of Connecticut illustrates the recommendations made by the state highway department. Tentative acceptance has been received from the Public Roads Administration covering the Interstate Routes themselves, as distinguished from the "distributing routes" (see map symbols). The mileage in the accepted Interstate Routes totals 263, of which 60 miles were classified as urban. Included in the 263 miles are the routes previously recommended by the National Interregional Highway Committee in their report to the President, plus Route US 6 from New York State to Hartford and Route 15 from Hartford to the Massachusetts Line.

Connecticut, High Density

The Connecticut designations are noteworthy as compared with other states on at least two counts — the density of traffic on our routes and the percentage of our total road mileage included. Except for Delaware, which has only a short section of the Philadelphia to Baltimore route as its entire system, we have the highest average traffic on the rural portions. (No comparisons are available for urban sections.) As for length of routes designated, our 263 miles of urban and rural road represents 1.84% of our total road and street mileage. We are surpassed only by Vermont, the D. of C., Florida and four Rocky Mountain and the desert states. The nationwide average for the 37,324 miles of the designated routes comes to 1.13% of the total road and street mileage.

Designation of the distributing routes is still to be accomplished, but the map illustrates what we believe Connecticut should have to round out the Interstate System designation. It brings out, too, the importance given to the urban areas in Connecticut within which the distributing routes are largely located. About 107 miles are included in our recommendations for

distributing routes.

From the standpoint of Connecticut motorists and of the cities and other urban places in the state, the Interstate System derives its importance from the priority, which will certainly be given to its improvement, to the character of the improvements, and finally to the magnitude of its influence, when completed, on highway transportation in our cities.

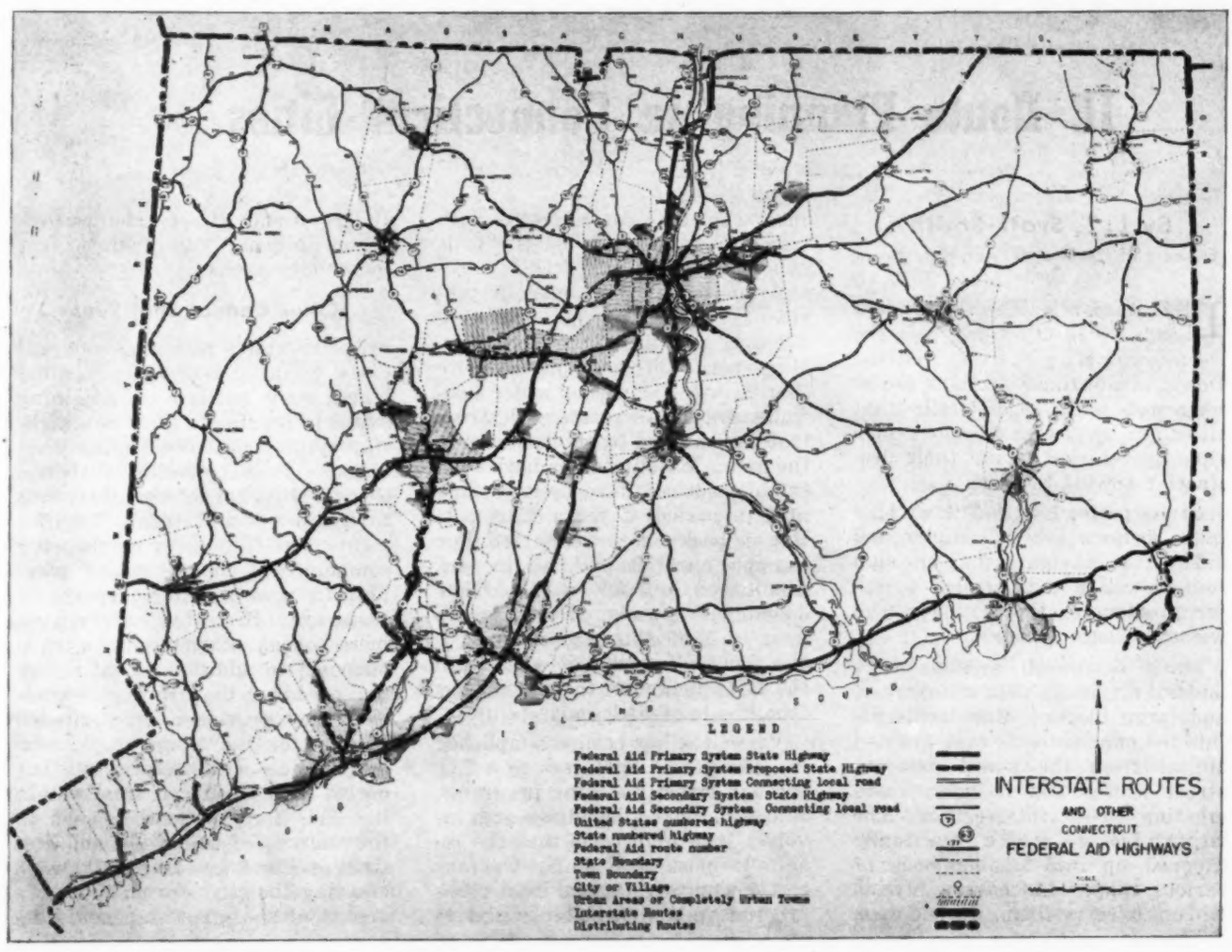
Standards of construction to be used in the development of the Interstate System have been established jointly by the Federal Government and the states working through an AASHO committee. These standards contemplate expressway construction with controlled access and the highest standards of line and grade. Improvements must be planned to serve safely and efficiently the traffic estimated to exist 20 years from the date of construction.

Great Safety Benefits

Because of the character of the improvements themselves, and because they will give relief where traffic conditions are now most hazardous, the reduction in accidents which the improvements will provide will be great. Some idea of the magnitude of the reduction in hazard can be obtained by comparing motor vehicle fatality rates on existing facilities. The Merritt Parkway here in Connecticut and the Arroyo Seco Parkway in California are representative of the highest type of heavily traveled highways. Each has had almost the same fatality rate — about 3½ per 100 million vehicle miles. There are characteristics of these roads not entirely consistent with the average road on the Connecticut portion of the Interstate System. For example, the exclusion of commercial vehicles. On the other hand, however, there are certain features of the parkways which have been improved in the standards established for future express highway construction. In my opinion we can expect the Interstate System, when completed, to operate with a fatality rate of 3½ or less per 100 million vehicle miles of travel; that is, with a safety record equal or better than that obtained on the parkways.

Our state-wide fatality rate from 1940 through 1945 was 8.8 per 100 million vehicle miles of travel on the state highway system. The Interstate System with a comparable rate of 3.5 would give a reduction of 5.3 per 100 million vehicle miles, or 5.3 lives saved for every 100 million miles of travel we transfer from existing roads to the Interstate System. We estimate that if the entire system had been completed in 1941 it would have had 16.3 hundred million vehicle miles of travel on it in that year. The saving in life for the year thus would have been 86 persons. There are all sorts of ways of expressing a savings of life of this magnitude to emphasize its importance in the hazard reduction job that needs to be done. The important thing to highway transportation officials, though, is that we *can* make a tremendous reduction in hazard through the development of the right kind of facilities for our major traffic movements.

With the exception of the Parkways and the New London-Norwich Road, practically all of our



major arterial improvements of recent years have been on the roads included in the Interstate System recommendations. The urban portions of the Interstate routes and the distributing routes include those urban improvements to which funds are being programmed under the urban allocations of the Federal Highway Act of 1944. Development of the system is not only sound and logical but entirely consistent with the construction work we have been doing and the plans we have made for future work in Connecticut. Completion of the improvements contemplated certainly will go a long way in providing the congestion relief and hazard reduction so badly needed in and between our cities.

Financing Problem

How soon should the Interstate and distributing route system be completed? Where is the money to come from? These are now the big questions in the problem of providing an efficient and safe main road network. We have the general locations of the routes established. We have standards set up in relation to present and future traffic requirements. We know approximately what it will cost. And, we are prepared to make thorough factual studies upon which to predicate the detailed planning of projects.

Our estimate based on current prices is that completion of the network in its entirety will cost about $300 millions. If we include only such roads as we have already commenced to improve to appropriate standards, and other routes equally in need of improvement for existing traffic, we should probably still have a cost estimate of around $200 millions. Present state revenues and Federal grants cannot provide more than $10 millions annually in the next few years. With the need for some of this money for improvements elsewhere on the state system, it is apparent that we will have to make a slow start on the major highway program. In my opinion, when it becomes clear to the motorists that the program cannot be progressed at a rapid rate under present conditions, there will be a strong demand for expansion of the program through one means or another. It is to be hoped that expansion of the program will *not* take the form of increased Federal aid, which for Connecticut and similarly situated states is an expensive as well as indirect way to finance its roads. It is to be hoped, too, that expansion of the program will be based on an integrated development of the entire system and not on piecemeal financing of individual improvements. The latter might well present obstacles to the obtaining of adequate advance planning. Also, in the end piecemeal financing would probably be more costly.

In conclusion, then, we will have, through the designation of the Interstate System and the distributing routes and the standards established for improvement, a well defined program on a limited road mileage that will ultimately cost about $300 millions. In large part the improvements are now urgently needed. The degree to which the efficiency and safety of our entire road system are increased in the years ahead is closely related to the progress which we make in the completion of those major improvements.

II. Route Planning in Connecticut Cities

By L. T. Scott-Smith
Engineer of Planning, City of Waterbury, Conn.

THE major traffic congestion headache in cities today is the Downtown Business District. Downtown business sections are so congested with local traffic that cities are by-passed whenever possible by vehicles having their destination beyond the city.

Street patterns in downtown business sections are so complex and difficult to navigate that through routes, well-posted, present a major problem to the stranger who wishes to pass through.

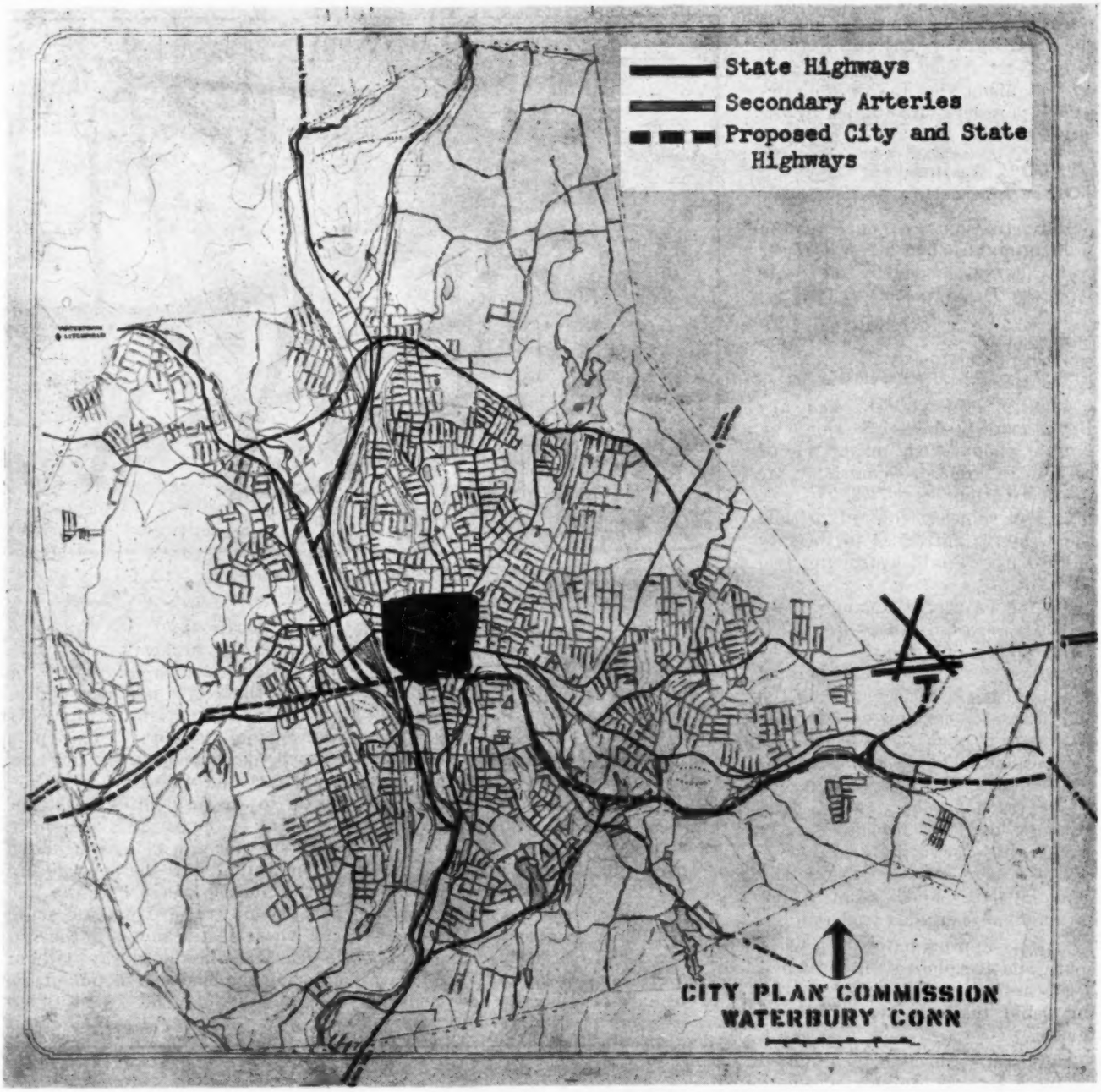
Many downtown sections were laid out originally with wide streets and large blocks. Encroachments into the public streets were granted almost from the start, reducing street widths and in many cases creating off-set intersections. The larger blocks were eventually chopped up into smaller ones of various shapes and narrow streets laid out to serve them. In one case, encroachments cut street width from 264 ft. down to 33 ft. It is now back to a width of 50 ft.

Attempts have been made to provide for future street widening through building-line restrictions. Many times this has done no more than provide the needed wider sidewalks for the increased pedestrian traffic generated by the business in the area. Building lines have been established and have been vacated after a period of years, thus putting us back where we started. For example, an 11-ft. building line was established in 1850 on one of our downtown streets. Forty years later in 1890 this was reduced to one foot. We could do a lot with the 11 ft. today but the present one foot line is of little value to us.

Very little has been accomplished in downtown business traffic through street widening programs. Widening in the downtown area involves such high costs that the results in most cases do not warrant the expenditure. Again, most cities are not in a financial position to undertake such street widening programs because of other urgent community needs.

Cities Cannot Shut Eyes

As the states plan on a regional basis, taking into consideration the highway pattern of adjoining states in relation to their own highway system, similar planning must be done in metropolitan districts. Central cities cannot shut their eyes to the needs and future requirements of the adjoining neighboring communities, whether it be planning for sewers, water, airports, or highways. Highways through metropolitan districts serve a triple purpose; in addition to satisfying the needs of the "through" traveler, they provide a much needed facility for the many people who live outside of the central city but derive their livelihood from within it. This fact is readily shown in the analysis of the origin and destination surveys made on highways entering the city. From the city's viewpoint the greatest benefits de-



rived from a well designed "through" route are these: it relieves congested "main" streets, and it enables the city to design its own thoroughfare plan on a sound basis for the future.

In Waterbury the heart of the city is the "Public Green" or "Exchange Place" which is the crossing point of the "main" streets. Nearly every major traffic artery converges on Exchange Place, thus forming a radial street pattern. Secondary arteries follow a similar pattern. Parallel streets are practically non-existent. Minor streets in the business section are narrow and jogged and most of them restricted to one-way traffic. As a result the majority of the traffic passing from one side of the city to the other passes along the main streets and through the Center or Exchange Place. With no exceptions, every bus line in town also passes through the Center. The problem of traffic congestion has long existed and has long been recognized, but with the exception of minor traffic improvements, very little has been done to ease the situation. The restricting of curb parking along some sections of the main streets has permitted greater use of these streets but they are still bottlenecked.

Maze Confuses Strangers

At the present time Route 6 of the State Highway system passes west and north of Waterbury to Hartford (See map). The alternate Route 6A passes through Waterbury in an easterly-westerly direction. This route through the city is difficult enough to follow even if you see every route marker, but once off the trail a stranger is hopelessly lost in a maze of winding streets and traffic regulations involving one-way streets, left turns, straight traffic, etc. requiring the services of a guide in order to get unsnarled.

Current planning for Route 6 through Waterbury started with the exchange of ideas between the State Highway Department and the Waterbury City Plan Commission. We knew where we would like to have the highway located but we had little supporting data. Several

possible locations were studied by the State Bureau of Highway Planning, and the final location decided on was along the line of the suggested parallel route studied by the city ten years ago.

90% Destined for City; Other Interesting Conclusions

Here are some of the revealing facts brought out as a result of the traffic surveys made by the State Highway Department:

90% of all traffic toward Waterbury had the City for its destination; 10% had a destination beyond.

43% of this traffic had the Downtown Business Section, an area of about ½ sq. mi. or 2% of the entire area of Waterbury, as its destination.

34,000 vehicles entered or left the westerly entrances to the city on two main highways, using two existing bridges.

To the east of Exchange Place 28,000 vehicles per day used East Main Street. This large figure is caused by the lack of parallel streets in the eastern section of the city that would relieve the traffic load on this main street. This information verified the previous studies by city officials that our major traffic problem was in relieving congestion from the center of the city eastwardly.

There were several reasons why we wanted the highway in the location finally decided upon.

1. It is approximately one block south and parallel to our East and West Main Streets, thereby providing relief to these overloaded arteries.

2. It runs through a blighted business section of the city where little harm could be done and much good accomplished by the elimination of obsolete structures.

3. It runs along the southerly fringe of the business section and not through it, allowing excellent opportunities for the development of access streets at the principal access points.

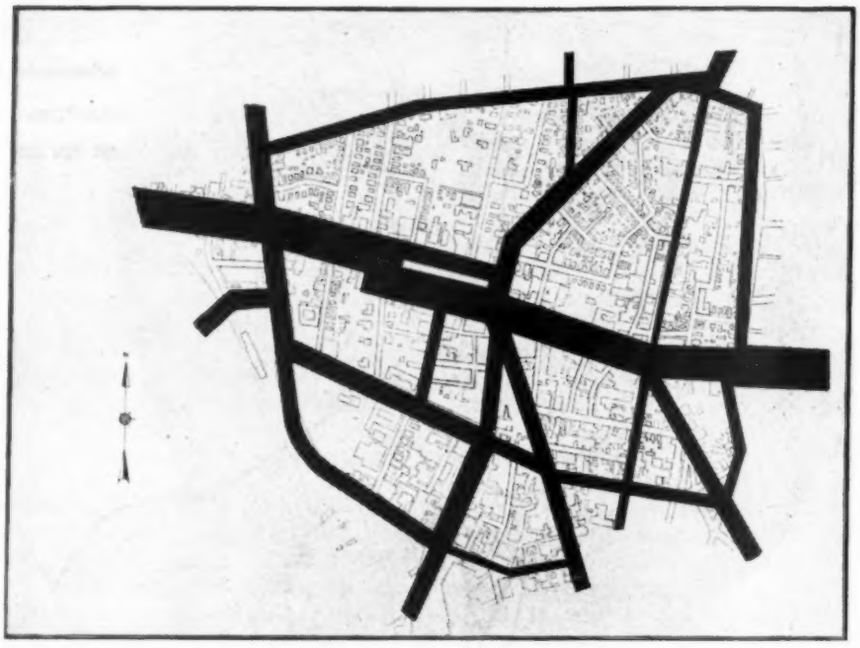
4. It is elevated over that southerly section of the business area thereby keeping the area intact instead of putting a portion of it on the "other side of the track."

5. The main access point is strategically located in relation to other transportation facilities such as the railroad and local bus lines and will be an ideal location for an inter-city bus terminal which is now located in the very heart of the city where congestion is the greatest.

6. It runs within ½ mile of the site of our proposed airport which is 4 miles from the city's center.

7. Its location east and west with the proposed connectors north and south form the base for Waterbury's major Thoroughfare Plan and fits into the future Master Plan.

Drawn on the large map of the city of Waterbury are the present state highways leading into the city with the local secondary arteries shown. The heavy dash line running east and west, with the shorter connectors north and south, is the location of the proposed limited-access highway. The dash line running across the top of the map is the city's northern-bypass connecting three state highways leading into the city. This bypass is to be developed during the next few years and will serve as a connector to the residential areas. The dash line to the south is the southern connector now being considered in connection with the development of the limited access highway and will permit traffic from the south and whose destination is to the east to reach the new highway without entering the business section of the city.



★ Average traffic volume on Waterbury arterials

CAA Book Will Help Airport Engineers

A comprehensive engineering handbook on soils in relation to airport construction, and the use of aerial photographs in selecting airport sites, is now available for two dollars from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The book, resulting from a cooperative study by the Technical Development Service of the Civil Aeronautics Administration and Purdue University, is entitled "The Origin, Distribution, and Airphoto Identification of United States Soils, With Special Reference to Airport and Highway Engineering." Authors are David S. Jenkins of the Civil Aeronautics Administration, and D. J. Belcher, L. E. Gregg, and K. B. Woods of Purdue U.

The handbook is expected to find wide use among engineers responsible for airport planning and site selection. It is in two parts. The first part discusses soil origin in relation to its mechanical characteristics, and divides all American soils into seven engineering types. It covers aerial photographic interpretation of soil types, and practical application to problems of location, construction, and design of airports and includes an extensive bibliography from which an engineer may select reference material applicable to his own locality.

The second is an album of 75 sample photographs covering most of the United States. Photographs covering about 80% of the whole United States are available through the Department of Agriculture. Both parts included in the sale price.

These Machines Saved Labor in Forming

Integral Street Curb

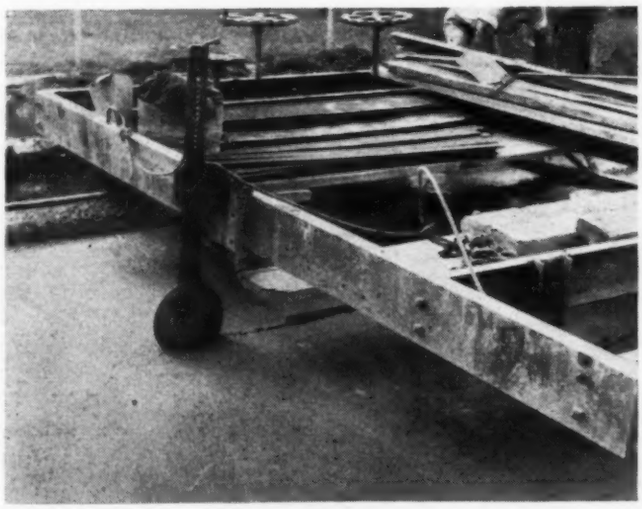
Specially adapted strike-off and finishing units employed by Denton Construction Company, one of 3 contractors on 14 miles of petition street work in progress at Dearborn, Michigan

AROUND Detroit and suburbs the Denton Construction Company can usually be counted on to come up with some novel labor-saving gadget on paving work. A couple of years ago "Roads and Streets" reported one of their best "Rube Goldberg" units for forming street curb in the same operation with a wide gutter section. (See R&S *September*, 1944). The other day we again visited a Denton job, part of a program of 225,000 sq. yd. of new concrete residential streets being built this year under petition by the City of Dearborn, Michigan.

Again the Denton job was marked by a special attempt to form that pesky integral curb with less than the usual hand finishing, labor supply and quality being what it is. The curb involved was a standard "rolled" curb, 6 in. wide and 5¼ in. high above the gutter. The company, we were told, was in the process of unveiling still another new curb-forming machine, but meantime was placing about 1700 ft. of 17.5-ft., half-width pavement per day with a 34-E dual-drum paver and two specially fitted machines following along.

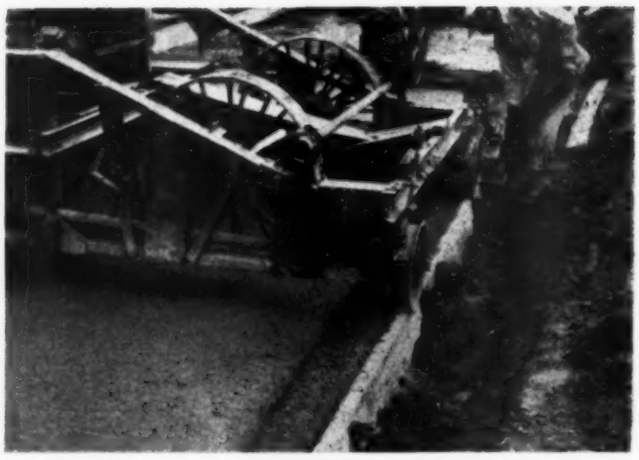
The first machine behind the paver consisted of a venerable old strike-off machine, to which nothing much had been done except that the screed was notched at one end so that it left a

★ Second forming operation for rolled curb — a cast steel mold and steel guide fins, mounted under one corner of the joint machine



★ The joint machine also is equipped with this knife, for cutting longitudinal dummy groove in the half-width street slab

★ Dummy cross joints are cut by forcing a steel strip, using the plow-handled forcing bar seen resting on the back of the joint machine



★ Denton's strike-off machine — notch in screed leavescrudely formed curb

★ (Left): While the slab is being worked with long handled floats, the curb is rolled up into approximately its final contour, using a darby as shown. (Center): Steel trowel, and later an edger, then completes the curb. (Right): Finishing of paper-filled joints, speeded by long handled edger

windrow of concrete on one side roughly the shape and size of the finished curb. The inner side of the machine rode a 6-in. steel form at the centerline, or else the slab edge if on the second run. The outer side rode 12-in. steel road forms which served to back up the finished curb. Specifications limited the screed to two strike-off passes. Some hand shoveling was necessary to keep excess concrete from piling up in front of the curb-forming offset.

Following this machine came the usual fellow with a long handled float, made of a 4-ft. length of aluminum channel iron faced with wood. The float operator worked from the inner side and from experience had learned to push up just the right amount of concrete needed to offset any deficiency in the concrete windrowed for the curb.

Next came the other "special" — a gasoline engine propelled joint strip machine which had been converted in the Denton shop to perform several tasks. Ahead of the machine and anchored to the front of the frame, a steel disc wheel knifed a longitudinal dummy joint groove along a line 6 ft. inward from the curb. A man riding the machine hand-inserted strips of

(*Continued on page* 105)

★ As a protection against truck tire ruts in the subgrade, batch trucks back to the skip via a timber platform which is dragged along by a small tractor

Urban Expressways And the Parking Problem

An excellent analysis of a still largely neglected problem that is growing more acute in America's cities

By Paul Donald

Public Roads Administration, Washington, D. C.

THE benefits which retail merchants will derive from expressways that are being planned for construction in many large cities during the next few years will depend largely upon the provision of adequate terminal facilities for the large volume of traffic the express highways will carry, according to traffic experts and city planning authorities.

All planning for the improvement of arterial routes in downtown sections of cities, they believe, should include a careful study of existing parking facilities and recommendations for the development of additional parking services where they are needed.

Plans already have been drawn for a score or more expressways, in various cities, on which work is started or will be started as soon as sufficient labor and materials can be obtained. Within a few years motorists will be able to travel swiftly and safely through many cities without hindrance from cross-traffic or frequent stops for traffic lights.

This travel utopia — the dream of every motorist — will be a boon to drivers who do not wish to stop in the downtown business district. But it will leave the daily traveler dangling, so to speak, at a considerable distance from his downtown destination if he cannot find a nearby place to park. The convenience and time-saving advantages of expressways are nullified, the traffic authorities point out, when motorists must spend 10 to 15 minutes circling blocks, looking for a place to park, after reaching their destinations.

Wide streets and broad highways, for which plans are now on the drawing-boards will encourage travel. Expressways will bring more traffic into downtown areas, creating a greater need for parking facilities.

The large volume of traffic flowing from an expressway into the downtown district will increase the traffic congestion on adjacent streets if the expressway is not supplemented by ample off-street parking facilities, making it possible for motorists to get their cars quickly off the street after they arrive in the vicinity of their downtown destinations, traffic experts declare.

The parking problem is an old story. Long before the war the lack of adequate parking facilities in downtown shopping districts was a matter of major concern to shoppers, merchants and city traffic engineers. Gasoline rationing and other travel restrictions during the war years reduced the number of shopping trips by car and provided a measure of relief from traffic congestion, but traffic volumes on rural highways and in urban areas rose sharply after these restrictions were removed, and are now approaching pre-war levels. When the demand for new cars is met, the volume of traffic on rural and urban highways will pass the previous all-time peak.

The traffic congestion and parking problems that existed in all large cities prior to the war will be dwarfed by conditions that will develop in the near future if cities do not act promptly to provide adequate parking accommodations in downtown areas.

Lack of parking space affects downtown business interests as well as motorists, and is a factor in the stability of city government financing.

During the 'thirties the shadow of decentralization began to cast its blight across downtown areas. Largely because of inadequate streets and insufficient parking facilities, business had begun to drift to outlying community centers where parking was easy and inexpensive. This resulted in a heavy loss in trade for merchants who could not follow the outward trend. When branch stores or new retail establishments offer lines of goods and services in suburban areas in competition with establishments in the central business area, and are more readily accessible than downtown stores, the central business district suffers.

Furthermore, when the incomes of merchants and property owners in any area decline, buildings are allowed to deteriorate and property values drop. Depreciation of downtown property values means a heavy loss in city taxes.

The Baltimore Commission on City Plan recently reported that the loss of property values in the downtown business district since 1931 has reduced the city's tax yield by $1,800,000 a year. Assessed valuations on downtown property values in Kansas City, Missouri, declined more than $60,000,000 in a decade. The drop in the assessed valuation of property in Detroit's central business district since 1930 is estimated at $200,000,000. Reports from other cities show similar decreases in downtown property values.

These figures indicate the far-reaching effect that poorly planned and inadequate highway and parking facilities may have upon the economic welfare of a community.

The parking problem is essentially a local problem that must be solved by the community, highway officials assert. Highway engineers

are concerned primarily with engineering and construction details. What happens to traffic after it leaves an expressway is not a factor that affects the design or construction of the expressway.

All highway engineers realize, however, that the proper location of entrance and exit ramps on expressways in the vicinity of central business districts should be carefully considered. In planning these locations, it is obvious that thought should be given to the availability of nearby parking areas as well as to the location of existing streets.

Many traffic authorities believe that all-day parking in the central business district of large cities should be discouraged. Facilities for all-day parking, they suggest, should be located on the perimeter of the congested downtown area, even though this may make it necessary for the all-day parker to walk several blocks to reach his destination.

In areas where parking space is at a premium, the development of off-street parking accommodations in which one parking space serves only one motorist during the business day is an expensive undertaking. On the other hand, a rapid turnover expands the capacity of parking facilities, making it possible for a greater number of shopping motorists to find parking accommodations.

Traffic experts advocate more extensive prohibition of curbside parking in downtown districts and more rigid enforcement of curb-parking regulations as a means of speeding up the flow of traffic on congested streets. Curbside parking, they point out, makes narrow streets narrower by depriving motorists of the use of travel lanes that should be left open for moving vehicles. Furthermore, the in-and-out maneuverings of curbside parkers block the movement of traffic in center lanes of the street.

If curbside parking is banned in downtown areas, additional facilities for off-street parking must be provided, either by establishing municipally-owned parking lots or garages, or by encouraging private interests to build open-deck garages that will be operated with a schedule of fees low enough to make them attractive to motorists.

In Philadelphia the Board of City Trusts erected a four-story building which is operated on a private-enterprise basis as a combination of parking garage and shopping center. Shops and stores occupy the ground and second floors in the center of the building and all four floors at both ends of the building. The remaining space, including the roof, is used for parking. The Board of City Trusts reports that the facility has revived the reputation of Chestnut Street east of Broad as a fashionable shopping district and has brought new life to the surrounding business district, which was on the verge of a decline.

In Akron, Ohio, a department store converted its first two floors into a parking garage, and the customers practically drive right up to the counters where they make their purchases. Merchants in other cities also have found that the operation of parking facilities, either as a "free" service for customers or as an income-producing investment, stimulates trade and pays dividends.

The tendency to "go underground" to find space for parking garages in congested downtown business districts, where suitable sites are scarce and real estate values high, has become more pronounced in recent years. Successful operation of a four-story parking garage beneath Union Square in San Francisco, in the heart of the hotel district and downtown business section, has encouraged other cities to consider the feasibility of similar underground parking accommodations in downtown areas. Citizens of Detroit, in the municipal elections last fall, approved a bond issue to finance the construction of a $2,000,000 subterranean garage, with parking facilities for approximately 1,000 cars. The garage, two-stories underground, will be built beneath Washington Boulevard, between Grand Circus Park and Grand River Avenue, almost in the center of the business district. Boston and Kansas City also are considering plans for underground parking garages.

Parking facilities operated by individual merchants or groups of merchants provide a measure of relief, but the parking problem in downtown business districts cannot be licked by haphazard methods. The seriousness of the problem calls for concerted action on the part of all civic associations, business groups, city officials, State legislative authorities and law-enforcement agencies.

Unless these groups unite in developing an effective plan of action, based upon a scientific study of local traffic conditions, the traffic clog resulting from the lack of adequate parking facilities in downtown areas will eventually strangle business and force merchants to move to outlying community centers that are more readily accessible for customers.

Traffic authorities suggest that all large cities should create a parking authority with special powers, under State enabling legislation, to acquire land and build parking garages which may be operated by the city or private interests. They also are in favor of municipal zoning regulations that will require new business and residential developments to provide their own off-street parking facilities.

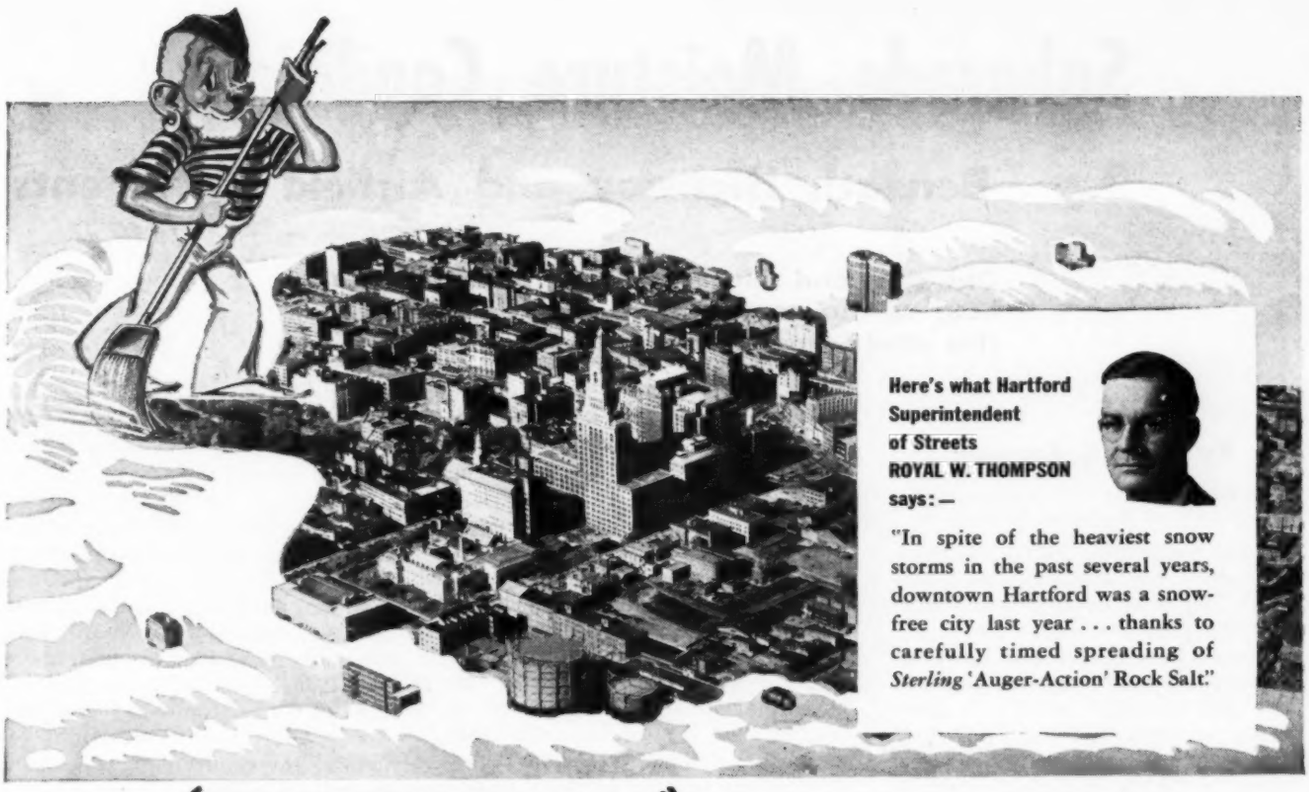
Whatever action is taken should be taken immediately, while urban expressways are still in the planning stage. Plans for the development of adequate parking facilities in downtown business districts should keep step with plans for the construction of arterial routes through cities if retail merchants and other business interests in the downtown area expect to remain on the "main stem" of traffic in the postwar years.

●

Chicago Shopping Centers to Have Better Street Lighting

The north-side retail shopping centers in Chicago will be more brightly illuminated by independent street lighting systems under plans being pushed by store merchants. Supplementing the regular city lighting system, the new facilities are expected to be in opation in 1947. In the Lincoln-Belmont district, for example, new 250-watt lamps will be spaced 70 ft. apart. Installation cost of $20,000 will be financed by $7 per foot assessment to property owners along the streets benefitted. Maintenance will be financed by periodic levies, the first one 44 cents per foot.

In the Rogers Park district forty-two new posts will be lighted with 500-watt installations initially and later by 1,000 watts, for which land owners will be assessed $4. per foot, tenants paying a monthly charge of 20 cents a foot for maintenance. In the Central-Uptown district the present 20-year-old system will be augmented by investing perhaps $50,000, based on two 500-watt lamps per pole. All installations are to be supplied current by a private lighting contractor for a specified period of time.



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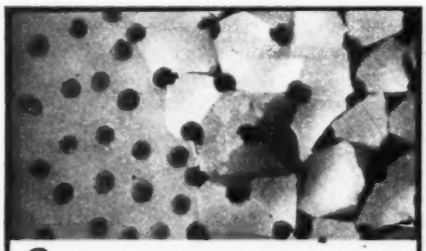

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Subgrade Moisture Conditions

Beneath Highway and Airfield Pavements

Old clay and silty clay subgrades commonly hold to moisture content above plastic limit, this study finds

By Miles S. Kersten

Assistant Professor of Civil Engineering, University of Minnesota, Minneapolis

THE scientific design of pavements for highways and airfields has received much study during the past few years and many advances have been made; however, many problems remain and answers are still partially lacking to questions on some of the important phases of pavement design. One of these is "What moisture condition will be attained eventually under the pavement?" Since the load carrying ability of a soil varies markedly with variations in moisture content this question is an important one, particularly for flexible pavements, and must be solved in order to achieve economic design.

The design of flexible pavements for highways has been based largely on previous experience, and most highway agencies have accumulated sufficient data and experience in construction on the various soils encountered in their areas so that the general requirements of thickness and composition of flexible pavements have been fairly well established. In the period before the war a few formulas for thickness design had been developed; these were ordinarily based on the wheel load and the bearing value of the subsoil. Airplane wheel loads in the pre-war period did not differ appreciably from highway loads; the DC-3, which was the heaviest plane in general usage, had a gross weight of only about 24,000 lb. or 12,000 lb. per wheel. Consequently runway and other airfield pavement thickness designs were also based on highway experience.

With the advent of the war, however, and the rapid development of airplanes with much heavier wheel loads, the previous experience in pavement design was wholly inadequate. Wheel loads increased to about 37,000 lb. for such planes as the B-24's and to 75,000 lb. for the B-29's. At the close of the war the Office of the Chief Engineers was investigating the design of pavements for a 150,000-lb. wheel load. The new problems encountered intensified the scientific attack on the design problem and literally dozens of new thickness design formulas were evolved and published. An investigation of these formulas or methods of design indicates that nearly all of them have some factor of strength or load carrying capacity of the subgrade, with numerous suggested methods of determination of this factor. In the use of any of these methods the test should supposedly be made on the soil with its moisture content and density at the same condition as that at which it will exist under the pavement. Since it is known that soils do not necessarily maintain the same condition during service as that at which they were placed, the selection of this condition is not a simple matter. In some methods, tests are performed on soils which have been soaked or permitted to absorb water until they supposedly contain the maximum amount of water the soil will attain in the field. Other methods merely require that the test be made at "the worst anticipated condition" or some similar statement.

Data from 9000 Scattered Tests

To attempt to aid in the selection of the proper moisture content for design, the Highway Research Board collected for analysis all of the available data of actual measurements of moisture contents beneath pavements together with soils information such as density, texture, and physical constants. Information was received from many state highway departments and also from the Office of the Chief of Engineers, War Department, and the Civil Aeronautics Administration. The conclusions from the study of the data do not necessarily represent the opinions of these agencies.

The study on highways comprised more than 6500 moisture determinations on 357 different projects located in 18 states and one Canadian province. The airfield data was taken from more than 160 airfields and aggregated more than 2500 tests. This airfield information was from eight U. S. Engineer Districts in different sections of the country and also from several CAA fields.

The moisture contents were computed in three different ways for the study; these were the percentage of saturation, the percentage of the plastic limit, and the percentage of the optimum moisture content. The percentage of saturation is merely an expression of the portion of the total voids of the soil which are filled with water.

Varies with Texture

The study of the highway data showed a very marked difference in existing moisture conditions according to the texture of the soil. In embankments which had been covered with pavements for several years the moisture content in the upper 6 in. of soil, expressed in any of the three ways, was generally low for sandy soils and sandy loams and progressively greater for loams, and clay loams, and was highest in the fine textured soils such as clays. Those projects which had high average percentages of saturation had in most cases subgrades of clay or silty clay soils. Loessial silty clay loams and silt loams usually had rather uniform degrees of saturation, commonly between 75% and the low nineties. Sandy soils exhibited a wide range of values but only occasionally were highly saturated.

Fine textured soils, such as clays, quite commonly possessed moisture contents in excess of their plastic limit. Soils with high silt contents

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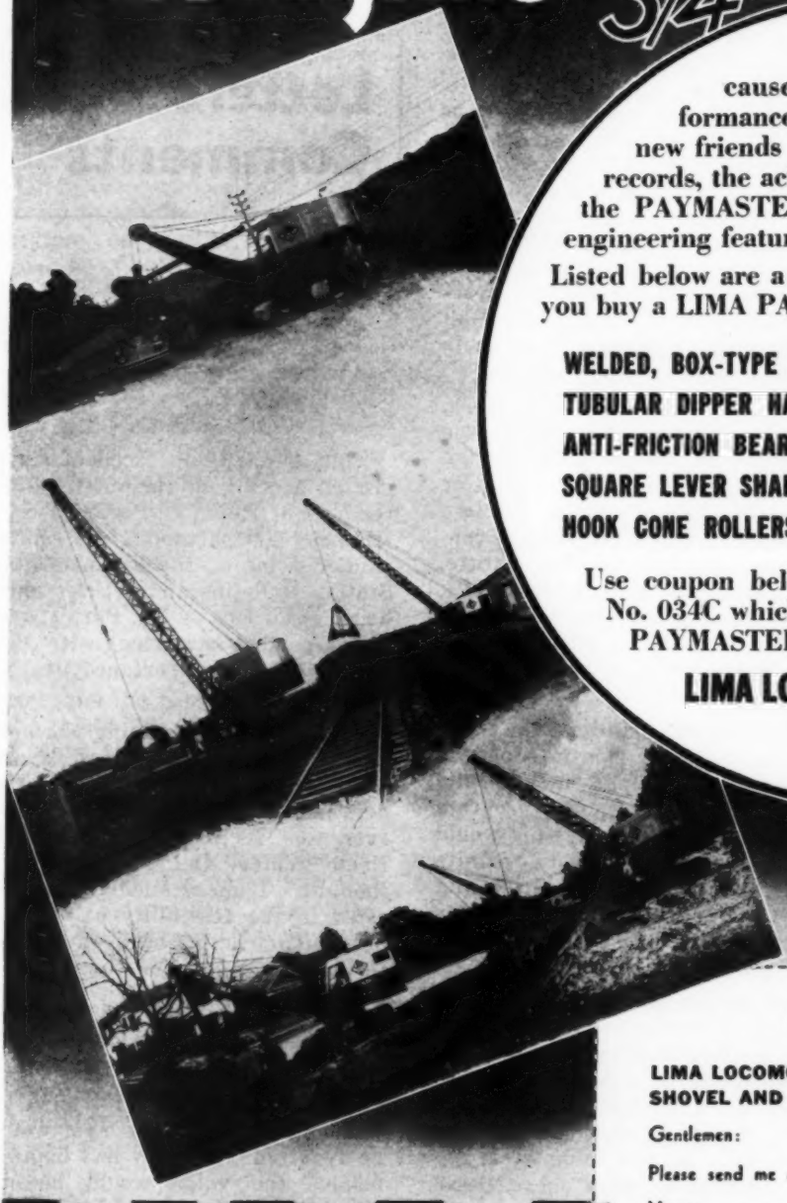

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apparently tended to attain moistures close to their plastic limit. Sandy loams only rarely possessed moisture values as great as their plastic limit.

Soils of all textures tended to exist at moisture contents in excess of the optimum moisture content in a substantial proportion of tests. On some projects with heavy subgrade soils, all of the tests showed moisture values greater than this constant.

Rate of Moisture Change

One of the particular questions which it would be desirable to answer is that of the rate at which moisture conditions change beneath a pavement. Investigation of this item requires periodic sampling of the subgrade soils. Such information was available on only a relatively few projects. It was found that soils which were covered when in a relatively dry condition tended to become wetter; the increase continued over a period of several years. A terminal condition is apparently eventually reached, since tests in several old roadbeds indicated that very little, if any, change occurred in periods of from one to five years. The terminal condition is dependent upon the texture of the soil, the climate of the area, and other factors.

There appeared to be a seasonal variation of moisture content, although it was difficult to depict with some data. Results of tests in Illinois and Texas indicated a high point about March and a low point about October.

A transverse variation of moisture content was quite commonly found beneath pavements. The values beneath the edge were ordinarily greater than those beneath the center portion; the higher values may have extended an appreciable distance under the mat from the shoulder. Fluctuations were also greater near the mat edge.

The airfield study covered a wider geographic range than the highway study and therefore the results of main interest are those concerning geographic variations. The general variations found in the highway data were also found to be true for the airports. For example, the moisture contents varied with the texture of the soil and those projects with high degrees of saturation were mostly those with heavy textured soils. The average age of the airfield pavements was less than two years and it is possible, therefore, that the subgrade moisture values were still experiencing a change.

Arid Climate Data

Many references have been made to high moisture conditions being attained beneath airfield pavement in arid regions. Very little, if any, evidence of this nature was found in this study, however. On 42 airfields in Western Texas, New Mexico, Arizona, and California where the average annual precipitation averages about 10 in., saturation values were not particularly high for any of the textural classes of soil; less than 5% of values were in excess of 90% saturation. Less than 10% of the soils were as wet as their plastic limit. A program of testing moisture conditions in highways adjacent or close to airfields in these regions on which the surfaces had an average age of 12 years showed extremely low average moisture contents, almost all of the soils being drier than their plastic limit.

In contrast with these conditions, subgrade soils on airfields in the southeastern humid area of the United States and in the humid or semi-humid midwestern section showed a variation of moisture conditions according to the texture, with from 30% to more than 50% of the heavier textured soils being greater than 90% saturated and from 80 to 100% of such soils being wetter than their plastic limit.

The study has indicated the existence of certain trends in subgrade moisture conditions which should be of value; a continuous program of subgrade moisture testing would aid in formulating more definite conclusions. A means of estimating the terminal moisture conditions beneath pavements would be a definite aid to pavement design.

The best means at present of obtaining an indication of what moisture content will exist in an embankment is to make an extensive series of moisture measurements and soil tests in other existing embankments in the same area, the embankment to be as old as possible and conditions of soil, pavement, etc., as nearly the same as possible. Such a series of measurements by a state highway department, for example, would provide data for the different soil regions and would serve as a basis for the design of pavements of comparable stability on all types of soil.

The author was with the Highway Research Board at the time of this study and the data were collected in the course of work on a cooperative research project of that organization, the Public Roads Administration, and the Asphalt Institute. Acknowledgement is also made to the Office of Chief of Engineers, War Department, the Civil Aeronautics Administration, and many state highway departments for the provision of data and other cooperation.

Letters and Comments

To the Editor:

I have read with interest the article "Load Supporting Power of Soil Substructures" by V. J. Brown, published in the June, 1946, issue of ROADS AND STREETS.

This article is an excellent summation of some of the outstanding research of Henry C. Porter, Texas Highway Department. I have studied some of the Experimental Station Bulletins and articles published elsewhere by Mr. Porter, and am in perfect agreement with Mr. Brown on the importance of the work.

The idea of determining working stresses for compacted soil layers and constructing these layers in the field is sound and practical. However, the section on "Design to Keep Water Out" needs more thought. I am particularly interested in the feasibility of cutting off capillary action between the natural ground and the consolidated soil substructure. Two treatments have been proposed.

(a) Coarse Gravel Layer

To have any effect I believe at least one foot depth of layer would be required. For any less depth I believe the voids would become filled through pushing the layer into the natural ground during consolidation and filling from the top during the construction of consolidated soil substructure. Even with a carefully constructed porous layer, there is some doubt as to its effectiveness in preventing moisture increases in the soil substructure.

(*Continued on page 99*)

(*Continued from page 96*)

Dr. Norman W. McLeod in his booklet "Fundamental Principles of Mechanical Soil Stabilization (Engineering & Contract Record — December 8, 1943, McLeans Publishing Co., Toronto, Ontario), points out that it is possible for moisture to enter the soil above the porous layer in the form of water vapor; as he states, "It is well to remember that moisture equilibrium can be established through the vapor as well as the capillary phase." In addition, for condition of heavy surface run-off when ditches are running full or water is held in the ditch through frozen or blocked culverts, the porous layer would act as a distributing system, permitting the entrance of surface water to the centre of consolidated soil substructure. Following this condition, any unevenness in the porous layer would act as a reservoir when the water in the ditches receded.

With these points in mind I do do not believe the gravel layer is the answer. In my opinion you would get equivalent results with less trouble by adding the same depth of gravel to the base course, i.e. designing for higher moisture content and lower density in the soil substructure.

(b) Impervious Membrane

The idea of an impervious membrane to me appears far more sound than the porous cut-off layer and I would be interested in knowing what type of membrane has been proposed. I believe a bituminous mulch of a layer of the natural ground, similar to bituminous soil stabilization, would be effective. The only difficulty with this proposal is that in soils where the greatest protection is required, such as heavy clays, it is almost impossible to obtain the homogenous mixture of soil and bitumen that is required for successful treatment. In cases of heavy clay, a possible solution would be to treat a layer of light textured soil from borrow pits and place it to act as an impervious membrane.

I am very much interested in obtaining any information on projects completed using this design principle or other possible methods of treatment which have been proposed.

G. B. Williams
Executive Assistant
Department of Public Works
Winnipeg, Manitoba

Construction - Equipment Financing

Some thoughts and observations on a service which is tailor-made to fit the financial needs of contractors and the equipment business

By H. K. Glidden,
Eastern Editor, Roads and Streets

IT HASN'T been so long ago that the local banker was the contractor's and equipment distributor's mainstay as far as financial matters were concerned. While it is not intended to belittle the part which the banker now plays in the construction industry, there can be little doubt but that he has to yield ground to a group of newcomers, namely, the construction-equipment financing companies. A borrower's dealing with his banker are, as often as not, largely on a personal basis with such things as past performance, negotiable assets, reputation, and work on hand being the factors which influence the size and terms of loans extended. Since few bankers specialize in equipment loans and therefore do not employ the services of skilled construction analysts, it logically follows that a need for specialized financing should exist in this field.

The immense backlog of all kinds of new construction and repairs piled up by wartime restrictions, expanding population, and unprecedented per capita wealth, cannot help but require equipment production on an unheard-of scale. The need for new equipment is immensely aggravated by the completely worn out condition of nearly every item of contractors' machinery, irreplaceable and overworked during the war years. The ranks of the manufacturers, distributors and contractors will be swelled accordingly. These fields of endeavor will undoubtedly attract increasing numbers of veterans, many of whom cut their eye teeth in construction while serving in the Seabees or Army Engineers. Many a shoestring will be run into a solid and respected business during this forthcoming "catching-up" period — free enterprise, competition, and the laws of supply and demand being allowed to function unhampered by overdoses of controlled economy.

The fullest possible use of working capital made this country great. Equipment financing companies, being corporations, function to increase contractors' working capital by channelling people's savings into equipment financing. Governmental restrictions, materials and equipment shortages together with uncertain labor conditions have served to delay the much-dreamed-of postwar era of freedom rationing, black markets and scarcities. It surely cannot be super-optimism to suppose that one day soon the log jam will be broken. The opportunity for service which will exist at that time can be expected to tax existing financing facilities to the utmost.

Growth Based on Service

The construction-equipment financing companies have attained their present growth by rendering service to all branches of the construction industry; manufacturer, distributor, equipment rental concerns and contractor. They finance almost every type of construction equipment, including new, used or surplus machinery. The willingness of these companies to pattern their terms to fit the borrower's particular needs and to refrain insofar as possible from exercising rights of repossession are easily accounted for by the fact that they are in business for the sole purpose of lending money.

In order that these companies may be reasonably sure of not having to continually foreclose themselves into the hazards associated with either the contracting or distributing businesses, it is necessary for them to know a great deal about construction equipment, its uses, earning power, rate of depreciation or absolescence, and market value. The field staff of these companies keep their fingers on the pulse of the industry in every way possible. They travel the entire country talking to clients, comparing the performance of competitive types of equipment, attending various association meetings, and studying the trend of resale prices of used equipment. From the vast amount of information and data thus compiled they are able to intelligently handle the financing of any piece of equipment, new or used.

Expands Use of Capital

They offer the distributor the opportunity of expanding his inventory by financing as much as 90% of the wholesale cost of new equipment. Most finance companies expect about a 10% reduction of the outstanding balance every 90 days on such loans. Where the distributor desires to engage in the equipment rental business, financing up to 90% is also possible with repayment arranged in installments over periods as long as two years.

The part the finance companies play in retail installment sales can be attractive to both the distributor and the contractor at the same time. Depending mostly on the purchaser's credit rating, the sales contract paper is taken over from the distributor with or without recourse and the distributor receives the full selling price immediately. "Without recourse" relieves the distributor of any further financial risk while "With recourse" leaves the distributor liable should the purchaser default in his payments. One of the service features offered by the larger companies is to allow the contractor to buy several items, from one or more distributors, and then combine the total unpaid balance into one simultaneous financial transaction. Where future deliveries are involved, finance company commitments can be secured which protect both the seller and the purchaser.

$1,000,000 or $1,000 in 30 Minutes

The general policy of operation is for the finance company to rely on its field staff to arrange terms and submit credit applications for consideration. The extensive facilities for checking credit ratings which are available to these companies make speedy approval or rejection routine so that a contractor in, say, Oregon or Connecticut can obtain complete financing accommodations with a minimum of time. The record seems to be a loan of over $1,000,000 arranged for in less than thirty minutes. This happened in the case of a contractor who, having bid successfully on a large rock-excavation job, decided that big-capacity equipment and lots of it would pay for itself on the job.

By contrast, there are the countless instances of contractors who wish to finance the purchase of a relatively inexpensive piece of equipment costing only a few thousand dollars. The procedure to be followed in obtaining the funds is virtually the same whether the amount involved be large or small and credit approval is based on a frank and friendly appraisal of a concern's present and future business prospects. While a good past-performance record carries considerable weight, any contractor, regardless of size or length of time in business, is acceptable as an applicant for financial backing.

Timely Tips — A Valuable Service

It is generally assumed that the purchaser knows best how to run his business. However, the better equipped finance companies employ a highly trained field staff who call on distributors and contractors at regular intervals and are thus able to provide their company with accurate, down-to-earth information on conditions in the construction industry.

These friendly visits also constitute a real service to the client, not only as a source of current information, but by passing along timely hints as to where hard-to-locate equipment might be found. One large finance company observes a hands-off policy of not interfering, in any way, with business or management. They do not look over a contractor's method of operation nor do they proffer suggestions regarding construction methods. When advice is solicited they are more than willing to help.

It is quite natural that these people are unwilling to assume either unsound or unreasonable risks. Otherwise they could not stay long in business. Having filled a long-existent need by providing a workable finance plan, their part in the construction industry is in

the same magnitude of importance as most other components for it is an established fact that successful construction operations are dependent on adequate time-saving equipment and the funds with which to buy them.

In these days when so many factors such as availability of materials, labor and equipment are awry, it is good to realize that our industry has at its disposal the services of financing specialists who are vitally interested in promoting the purchase, sale and rental of construction equipment.

●

Michigan Standardizing Trunkline Driveway Entrances

The Michigan State Highway Department, in cooperation with the cities and towns of the state, has standardized specifications for construction of driveways entering state trunklines in both business and residential districts, according to Commissioner Charles M. Ziegler. These plans will be the basis for the approval of all applications for permits on state routes and will provide a guide for proposed driveway layouts.

County road commissions, cities and villages have been furnished the approved standard plans and have been requested to pass this information on to prospective builders where any work is being contemplated. Ziegler stated that past experience has shown that where the owner is properly informed before construction is started, he can conveniently comply with the standards without increased expense. In addition, the cooperation of local officials has been requested in reviewing and approving applications in business and residential districts before the applications are submitted to the district office. Applications are made on form (No. 452) which includes a drawing of the proposed layout.

Brazilian Highway Engineers Study American Methods

Brazilian highway engineers now visiting industrial plants and viewing highway programs in the United States are here for the purpose of studying American methods which they may adopt or revise for use in connection with a $65,000,000 municipal project for Sao Paulo, including a subway, and an $85,000,000 state highway program. The highway program will include an improved highway between Sao Paulo and Santos, Brazil's principal coffee port.

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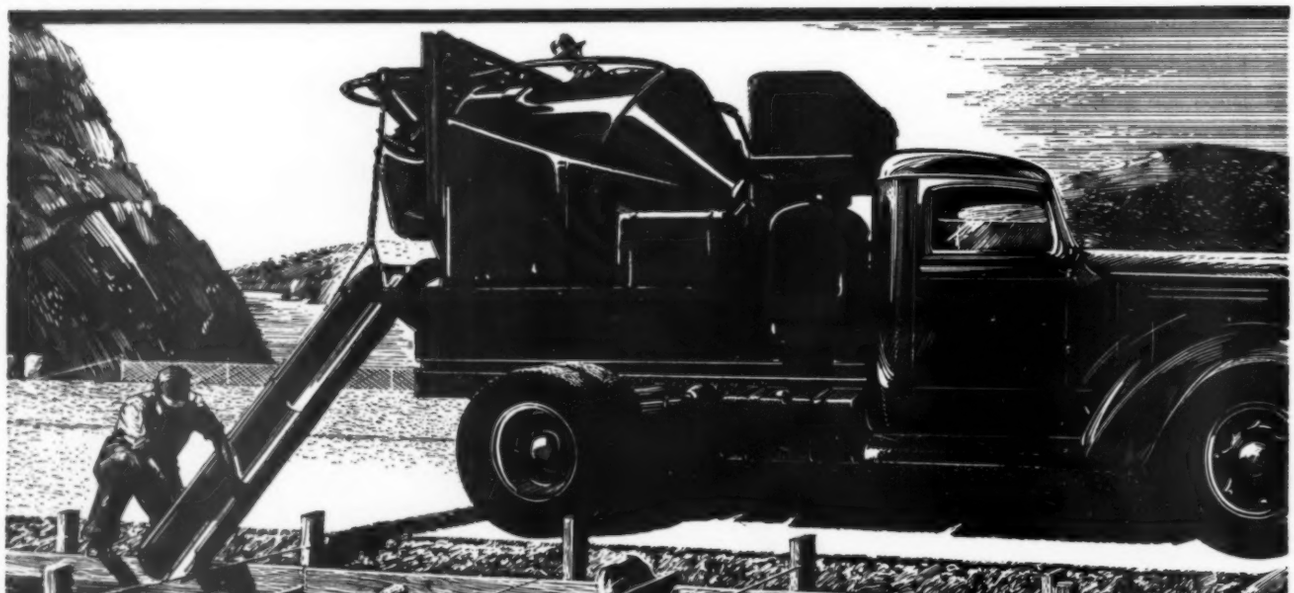


Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

Other new design details: Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

These are but a few of the reasons why the Blue Brute Hi-Up is setting a new high in truck mixer performance — and offering time-saving, trouble-free production of better concrete at lower cost.

Get the whole story from your nearby Worthington-Ransome dealer, or write for Bulletin No. 221.

R6-7

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute Hi-Up Truck Mixers and other construction equipment can put your planning on a profitable basis — and prove that *there's more worth in Worthington*. His name is listed on Page 105. Blue Brutes include:

RANSOME EQUIPMENT

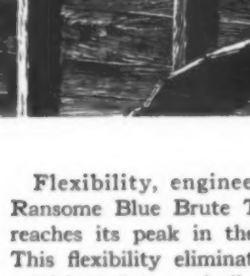
Pavers, Concrete Spreaders and Finishers*, Portable and Stationary Mixers, Pneumatic Placing Equipment, Truck Mixers, Plaster & Bituminous Mixers and Accessories.

WORTHINGTON EQUIPMENT

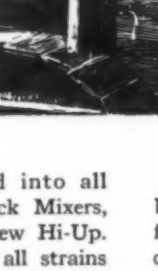
Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Contractors' Pumps* and Accessories.

*To be announced.

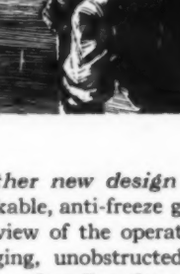
BUY BLUE BRUTES



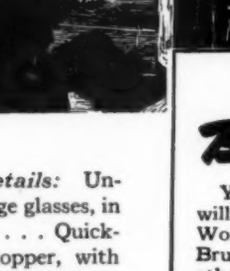
Truck Mixers
Capacities:
2, 3, 4½ cu. yds.



Portable Mixers
Capacities:
3½, 6, 11, 16, 28 cu. ft.



Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.



Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

(*Continued from page* 90)

asphalt impregnated dummy paper.

As the machine traveled, a cast steel moulding iron and a steel throat further formed the roll of concrete left by the screed, leaving a half finished curb.

As a third function, the machine served as a carrying rack for a two-man-operated joint bar, which cut grooves for tranverse dummy contraction joints.

Curb Hand Finished

Next came another pass or two with a second long handled float, followed by troweling and edging. The latter operations were done with the help of a bridge and a long handled edger. As surface finishing progressed a man chosen for his special skill hand-finished the curb by successive use of a heavy wood darby, a 6-ft. hand-held wooden straight-edge, and a steel trowel. A broom finish and membrane curing application completed the job.

The contractor was required to protect the subgrade from rutting after rolling. A small crawler tractor on the subgrade drew a wood platform along ahead of the paver, and batch trucks were required to shuttle onto this mat to dump into the skip.

A motor grader, mechanical fine-grader and 8-ton three-wheel roller comprised the rest of the outfit. The contractor handled the job with only fifteen or twenty men plus truck drivers from the form setters on back.

Property Owners Enthusiastic

Fredrick Storrer, city engineer, in commenting on his city's extensive street program for the present year, noted that property owners have been anxious to go ahead with street betterment even though the cost has gone up over former years. Six contracts ranging from 1½ to about 4 miles have been let this year, contracts usually comprising numerous petitioned blocks in a single neighborhood which could be handled under an efficient work schedule. Bid prices for 6-in. uniform concrete slab (un-reinforced) have ranged from $2.10 to $2.55 per sq. yd. which amount includes the usual light excavation drainage, curb, cleanup and other details. About 20% of the program involves arterial streets, with 7-in. slab thickened to 9 in. at the center-line joint. Air entraining concrete has been used throughout.

●

County Sets Price For Driveway Snow Work

Removal of snow by the Dickinson County, Mich., highway crews from private driveways outside the corporate limits of any community in the county will cost the property owners $6 a year for a 300-foot driveway and 50 cents for each additional 100 feet, it has been decided by the road commission.

Payment must be made in advance and no refunds will be made excepting where home-owners move from their property early in the season.

Farmers and others who desire driveways plowed by county equipment must keep them in good condition.

●

Truck Production Reaches All-Time High — Truck production in United States in August reached an all-time high with 105,506 units. The previous high month was April, 1937 when 96,107 trucks were produced.

★ A standard mechanical subgrader, riding 11-in. steel road forms, proved efficient on half-width paving operation

Five More Underground Garages for San Francisco

With a combined space for 8,000 vehicles, plans are announced for five new underground parking garages for downtown San Francisco. This city has had a privately financed 1,700 car under-surface garage under Union Square since 1942, and the new projects are in recognition of the success of the former project, which has sheltered 900,000 cars a year and proved financially successful.

The new garages, authorized by the city park commission, will be located beneath the present surface of the civic center plaza and several public squares. Private operators build and run the garages and sign leases for the areas occupied. As with the former project, the procedure will be to remove present lawn, shrubbery and recreational facilities, excavate and build the underground structure, then replace and restore all surface details.

Park commission secretary Gerald Linares is quoted as saying, "The underground garage program is one method of solving the city's parking problems, and at a profit. One condition of the leases will be that the buildings shall revert to the city after the indebtedness is paid off. The leases meanwhile will bring the city a steady income, while at the same time removing thousands of automobiles from the streets."

N. Carolina Engineers Survey Bridge Capacities

State highway engineer W. Vance Baise of N. Carolina has reported that his 10 division engineers plan to make an intensive investigation of the load capacities of the state's 16,000 county road bridges.

Each division will use one or two men to check personally and log the capacity of the spans linking North Carolina's secondary road system. Capacity signs on the weakest bridges will be changed first when necessary, and proper signs for all county bridges installed as soon as possible. Many of the bridges have reached a "critical" condition because of natural deterioration, heavy war-time loads during the past four years and skimpy maintenance due to lack of material, labor and equipment.

Oil Seals

How to Install Them Carefully and Cut Repair Costs

This article, written by C. F. Zimmerman of R. G. LeTourneau, Inc., is applicable to any equipment using oil seals.

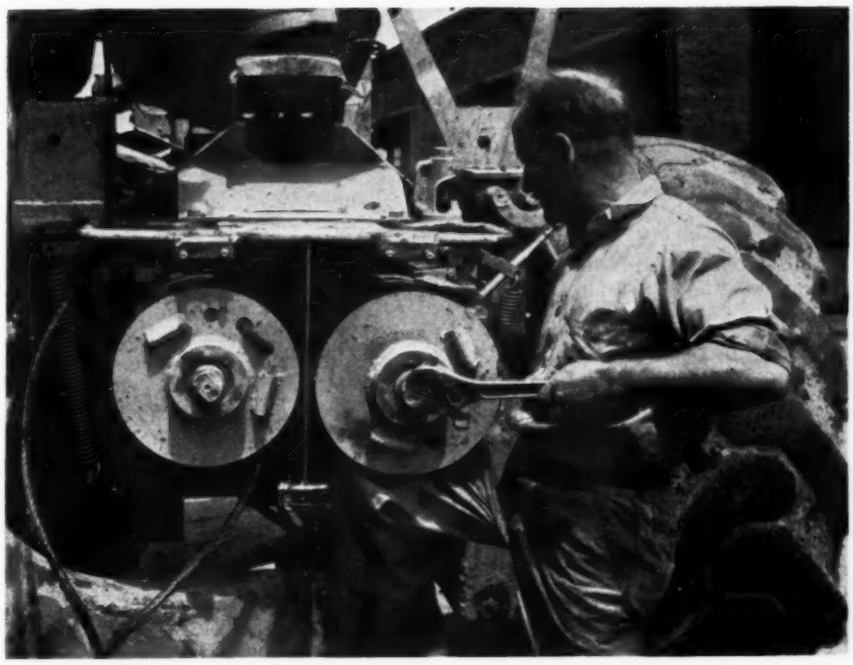
IMPROPERLY installed oil seals may be the cause of unnecessary repairs which are expensive from a standpoint of mechanic labor and unnecessary down time for equipment which might otherwise be operating on the job. The following instructions for installation of the seals should be carefully followed:

Here's what to do

1. Place new oil seals in a bucket of light oil before you start disassembly operations. Any seal which is not used to retain oil, does not have to be soaked before installing. After removing the seals from the oil bath, roll the seal leather with a round object such as a hammer handle until the leather is soft and pliable. (See photo 1.)

Note: This operation is not required if the seal packing member is made of neoprene.

2. Before installing the seal into



★ Photo 3. When installing the cable drum shaft, be sure and hold it level, supporting its weight on knee. This will prevent damage to the oil seal

★ Photo 1. Here's how to roll the seal leather with a round object such as a hammer handle, after removing seal from oil bath. This will make the leather soft and pliable

★ Photo 2. Using blocks of wood this way to position an oil seal will prevent damage to the seal cup. NEVER hit a seal directly with a hammer, punch or bolt

position, be sure the shaft or spline which the seal slides over is properly cleaned, also the surface against which the seal presses. After cleaning, coat surfaces with a light layer of grease.

3. It is considered good practice to apply a light coat of shellac or flexible gasket cement to the outer diameter of the seal just before pressing it into the housing bore. This will provide protection against any possibility of oil seepage through the press fit between the housing bore and the seal.

4. The use of an arbor press for seal installation is desirable if one is available. Where it is impossible to use a press of this type, the seal may be installed by use of a hammer and a block of wood (See photo 2.) However, be careful that the edges of the seal cup are not damaged as this may tend to freeze the action of the seal spring. Never hit a seal directly with a hammer, punch, bolt, etc. Apply the pressure evenly around the seal to prevent breakage or distortion.

5. Before installing a seal over a shaft, be sure that all burrs or sharp corners are removed. Extreme caution should be exercised during the installation operation of this kind, otherwise damage may result to the leather member of the seal.

Be Careful When Installing

Whenever a seal has been positioned, be sure that the seal leather member does not become damaged when installing the shaft. Be very careful when installing the cable drum assembly into the Power Control Unit case. If the cable drum shaft is kept level and caution is used when the shaft is installed into place, no damage to the seal should result. (See photo 3.) A major portion of oil seal failures can be traced to faulty and careless installation at this point.

6. Be sure and install the oil seal with the packing member cupped inward toward the grease or oil chamber, with the exception of the hub oil seals in Scraper wheels, Crane wheels, Rooter wheels and Sheeps Foot Roller drum shafts. The reason these hub and drum shaft seals are installed in the opposite position to all other seals is to allow any pressure which may build up inside and any excess grease to pass under the packing member when greasing. This eliminates any danger of blowing the packing member inside out.

If oil seals are subjected to extreme heat, the packing member will become hard and allow the oil or grease to escape. Excessive heat is usually caused by improper adjustment or incorrect operational practices.

(*Continued on page* 110)

How a Cast Iron Block was Welded With Steel Patches

Reprinted with permission from a bulletin by the Eutectic Welding Alloys Corporation, New York, N. Y., this description involves the use of this company's EutecTrode 24 commercial rod, which is described as being of a type which bonds to the base metals well below the base metal melting point, forming a joint through surface alloying. (EDITOR).

THE following procedure is described in a letter from a Mr. Ivan Moe, welder employed by a Western transit company. It is of particular interest as an example of welding steel to cast iron. . .

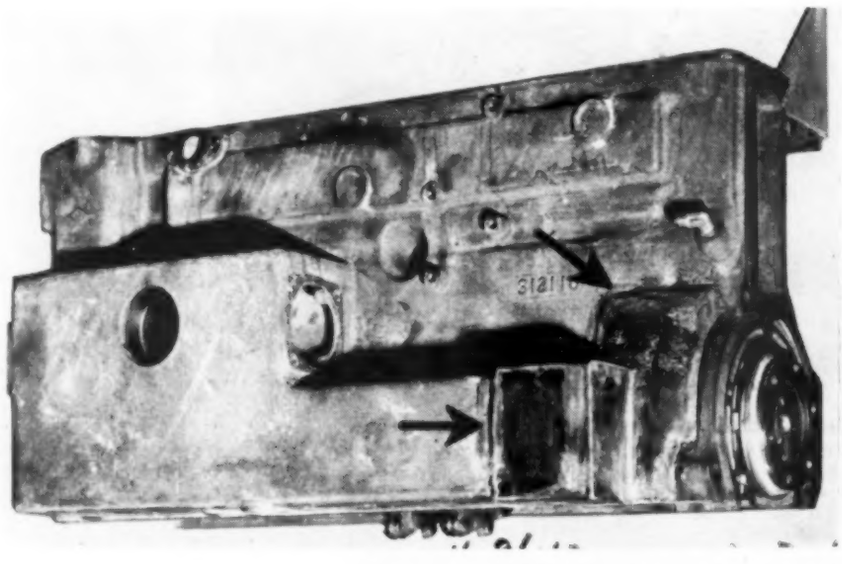
The accompanying illustration shows how we repaired some breaks on a Hall-Scott cast iron block. Our mechanical foreman was undecided whether or not to salvage this broken cylinder block. It seemed to him to be totally unweldable. However, after he found out how long he would have to wait for it, he directed me to go ahead with the welding operation.

I decided that the easiest and safest way to reclaim this casting would be to weld steel patches over the breaks. So I cut patches out of 10 gauge sheet steel and welded them to place. The regular procedure recommended by the rod manufacturer was used for the welding operation. As is usual on cast iron, care had to be taken to prevent cracking of the base metal. However, I was fortunate in that I did not have to preheat. It would have been quite a job to preheat this casting. Using a 5/32-in. diameter rod, and with my DC machine adjusted to 90 amperes-straight polarity, I tacked the sheets to the casting — using one-inch-long tacks. After the plates were tacked on, I filled in the rest of the weld, using a skip-around technique. At no time did I run a bead longer than 1 to 1½ in. I welded very slowly and peened each deposit. With this method I was able to keep the casting very cold and obtain a weld deposit that showed no fractures.

EutecRod 15 Used for Filling Application

A portion of the casting to which the oil pan is attached was missing. Using a piece of steel as a filler, I welded this in place. However, I was a little careless and when I was through welding, this part was slightly lower than the rest of the surface. I easily corrected this matter by filling the low portion with another type of rod, (EutecRod 15-Ed.), and filing off the excess metal until it was level with the rest of the casting. This alloy works beautifully for this type of application.

Even with all the precautions I had to take, the job was completed in approximately ten hours. However, with the use of your alloys I was able to save my company several hundred dollars and also put a feather in my cap.



(*Continued from page* 108)

If cable drum shaft or wheel bearings are adjusted too tight, this will cause the bearings to overheat and the oil seal will be subjected to the same heat, which in time may cause the packing member to become hard. This will allow the oil or grease to escape and possibly result in damage to the bearings. If an oil leak past the seals in the Power Control Unit should occur, there is danger of oil getting onto the clutch and brake facings, causing further slippage, overheating.

Clutch slippage and clutch drag are the most common causes of excessive heating in Power Control Units. Clutch slippage is usually caused by the operator engaging and disengaging the clutch too slowly or by the clutch being incorrectly adjusted. Clutch drag is usually caused by the main gear and cable drum bearings being too loose in adjustment.

If the Power Control Unit cable drum shaft bearings, wheel bearings, etc. are not kept in correct adjustment, the oil seals are often subjected to severe pounding by the looseness of the wheel or shaft and damage to the packing member may result.

Careful inspection of the oil seals is recommended whenever the equipment is being overhauled. If there are any indications of wear, replace the seal. It will be less expensive to replace a seal then, than to leave a partially-worn seal in place, and to run the danger of having it break down completely, thereby causing unnecessary down-time for equipment, and additional expense of repair.

Lubricate Correctly

Be sure when lubricating your equipment that the correct procedures are followed, otherwise there may be oil seal leakage, etc. If lubricants lighter than recommended are used, the oil may seep under the seal and the incorrect grease may break down and become fluid from heat.

If a gear case is filled with oil above the level plug, leakage may result. To correct this condition, lower level to proper oil level as indicated by the level plug.

If the Power Control Unit cable drums are filled more than 2/3 full of grease (possibly by inserting grease through rear end of drum shaft with grease gun), it will cause grease to be forced out around the seals as pressure is built up inside drum, due to the heat of operation.

Exercising caution and care in installing oil seals will enable you to operate your equipment at top efficiency at minimum loss of time due to oil seal failure.

●

State Highway Billboard Control — The Superintendent of Public Works of New York state has ordered a survey of all billboards along state highways as a preliminary to corrective measures designed to improve highway safety.

Mail Inserted Card or Inquiry Blank (page 129) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See New Construction Equipment and Materials beginning on page 113, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 129 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

We Have Only 25 Toll Roads

Our 25 motor vehicle toll roads, 240 toll bridges, 6 pay-as-you-enter tunnels, and 561 ferries yield approximately 96,000,000 in a normal travel year, yet these toll-ways are few when compared with our 3,300,000 miles of roads and streets and our tens of thousands of bridges, according to figures compiled by Charles M. Upham, engineer-director, American Road Builders' Association. Toll roads in the U. S. total only 346.6 miles and this includes the 160.7 miles of the Pennsylvania Turnpike, the country's longest toll road.

The Wilbur Cross Parkway in Connecticut, 2.15 miles long, is the shortest public toll road. The longest private toll road is Heckscher Drive in Florida with 16.1 miles.

Four states, Arizona, Nevada, New Mexico and Utah have no toll facilities of any kind. Eight states, Delaware, Idaho, Indiana, Iowa, Kansas, Minnesota, Nebraska and Wisconsin, have no intrastate but one or more interstate services. Kentucky leads the nation with 128 toll facilities, all bridges and ferries. New York is second with 78 which includes all forms, and Illinois rates third with 62 bridges and ferries.

●

Motor Vehicle Registrations Increase

According to estimates by the Public Roads Administration, based on reports from state authorities, the number of privately-owned motor vehicles registered in 1946, despite limited production of new cars, will be substantially greater than 1945 registrations.

Truck registrations will reach an estimated total of 5,423,000 an increase of 588,000 or 12.2% over 1945 registrations, and approximately 563,000 more than the number registered in 1941, the prewar peak year for motor vehicle registrations.

Automobile registrations are expected to increase from 25,691,434 in 1945 to an estimated 27,088,000 in 1946, a rise of 5.4%, but will be about 2,436,000 or 8.3%, fewer than the 29,524,101 cars registered in 1941.

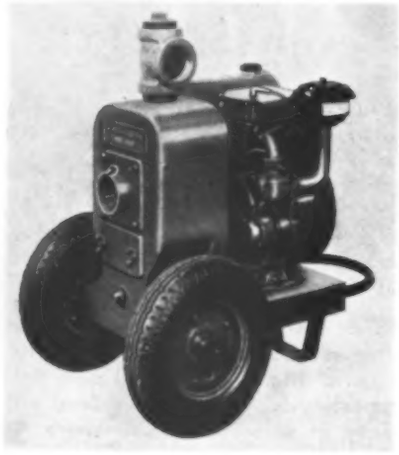
California, with an estimated total of 2,955,000 privately-owned vehicles to be registered in 1946, and New York, with an estimated toal of 2,560,000, will lead the states in motor vehicle registrations. Pennsylvania will be third with an estimated 2,075,000 registrations. Thirteen states will have increases over 1941 registrations.

NEW EQUIPMENT AND MATERIALS

New Construction Equipment and Materials

New Centrifugal Pumps

1. Quick and dependable self-priming action without priming valves or "recirculation" is an outstanding feature claimed for the new Blue Brute line of portable self-priming centrifugal pumps of Worthington Pump and Machinery Corporation, Harrison, N. J. Fabricated of corrosion and abrasion resisting steel, they are rugged, light



New Portable Centrifugal Pump

in weight and streamlined in appearance. All sizes except the smallest (1½ in.) are regularly equipped with pneumatic-tired wheels, towing handles and lifting bales. The 1½ in. pump is base mounted with lifting handles, readily carried by one man. The 1½ in. to 4 in. pumps are available with standard air-cooled gasoline engines, while the 6 in. and 8 in. units are equipped with water cooled engines, either gasoline or diesel, at customer's option. Engines are regularly equipped with all necessary accessories.

Pump Valve Units

2. Designed to illustrate the wide application of Durabla valve units for reciprocating pumps and Diesel engines, Durabla Catalog No. 920, "Pump Valve Service" has just been published by Durabla Manufacturing Co., New York, N. Y. The applications illustrated are primarily on pumps and Diesel engines which use Durabla valve units as standard equipment, but the details presented not only provide a summary of the design characteristics of Durabla valves but also indicate their adaptability for use as replacement units on any type of reciprocating pump.

New Model 12-Ton Truck

3. Manufacturers of the FWD Model M10, which was virtually out of production during the war, is being resumed by The Four Wheel Drive Auto Co., Clintonville, Wis. Among the improvements in design on the M10 are the FWD Universal cab, which features a number of comfort and safety advantages, a sturdy streamline

New FWD Model M10 12-Ton Truck

radiator grill and improved heavy-duty axles. Engines with higher horsepower rating will be installed in the M10. The standard engine is a gasoline 186 B.H.P. engine with a customer's option on the installation of a 200 B.H.P. Diesel engine. The rated gross vehicle weight of the Model M10 is 44,000 lbs. While the FWD Model M10 has been placed in snow removal service by most highway departments, the new Model M10 will be marketed as a year 'round performer in all types of highway construction and maintenance.

New 25-Ton Jack

4. A new Simplex ball bearing bridge and industrial jack designed for heavy duty lifting, lowering and supporting has been introduced by Templeton, Kenly & Co., Chicago, Ill. This Jack, Simplex No. 2522, has a capacity of 25 tons and will lift a maximum height of 10¼ in., yet it weights only 140 lbs. Lifts high or low work to full rated capacity on corrugated top cap which is 22 in. above ground level or on 10 in. square toe lift which is only 4⅜ in. above ground level.

New Line of Drifters

5. A complete line of Blue Brute drifters for general construction work, mining and quarrying has been announced by Worthington Pump and Machinery Corporation, Harrison, N. J. They are manufactured in three sizes, 3 in. 3½ in., and 4 in. cylinder diameters. Each drifter may be mounted as a hand crank machine,

Model WPMS Drifter

Model WHC; an air motor driven unit with motor attached to guide shell. Model WPMS; or with the air motor attached to the back head of the drifter, Model WPM. The width of all cylinder ways is the same on all sizes and models and each size drifter uses

Mail Inserted Card

for data on equipment described on these pages. See also inquiry blank on page 129.

the same guide shell. The Worthington pneu-motor is of the 6-vane rotary type with simple spur gears. With the exception of gear case and motor housing, motor parts used on the WPM and WPMS machines are interchangeable. These drifters are of advanced design, well balanced and streamlined for convenience in handling and modern in every detail. They are equipped with standard 4-pawl rifle bar rotation and the time tested and proven Worthington end-seating, positive-acting automatic valve.

Earth Moving Equipment

6. The basic zones recognized in modern problems of earthmoving are defined and the types of equipment suitable to each are outlined in an instructional booklet, The 1-2-3 Of Zoned Equipment, published by Caterpillar Tractor Co., Peoria, Ill. Delineation of the zones in which power equipment, slow speed hauling equipment and high speed hauling equipment are utilized for maximum productivity provides the theme of this profusely illustrated publication. How "Caterpillar" products meet these zone requirements and how they adapt themselves to in-between cases, is shown.

New Trencher

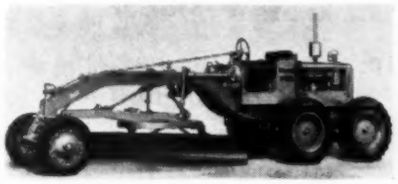
7. A new trencher brought out by the Parsons Co., Newton, Ia., sidesteps surface obstructions as close as 10 in. to either side of the projected trench. The boom on this new Parsons 211 Trench-liner shifts from side to side across entire width of boom carriage and is easy to shift, because it rides smoothly on big diameter rollers. Arc-type spoil conveyor lifts material to 6 ft. 9 in. easily dumps into 1½-ton trucks. Telescoping ladder-type boom can dig over and under obstructing pipes in trench, virtually eliminating hand work.

New Parsons 221 Trenchliner

Condensed Specifications:	
Depth of Trench:	Up to 8 ft. 0 in.
Digging Widths: Buckets:	16 in., 20 in., 24 in.
With Special Teeth:	22 in., 26 in., 30 in.
With Sidecutters:	28 in., 32 in., 36 in.
Digging Speeds:	25—from 2 in. to 118 in. per minute
Bucket Line Speeds:	5—31 to 232 ft. per minute
Traveling Speeds:	5—½ to 2¾ miles per hour
Conveyor Belt Speeds:	5—48 to 357 ft. per minute

Motor Grader

8. Production of the "Caterpillar" Diesel No. 212 Motor Grader, suspended during World War II to permit increased manufacture of products most urgently needed by the armed forces,



Caterpillar Diesel No. 212 Motor Grader

has been resumed by Caterpillar Tractor Co., Peoria, Ill. Powered by a rear-mounted 35-brake hp. 4-cylinder, 4-cycle "Caterpillar" Diesel engine, the No. 212 motor grader is made available in both tandem and single drives. It is normally equipped with 10-ft. moldboard. Smallest of three sizes of "Caterpillar" Series "12" motor graders, the No. 212 is built primarily for those whose work requirements do not warrant purchase of the larger models.

Diesel Power

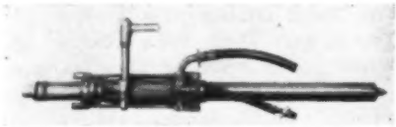
9. A tribute to the versatility of Diesel power, and a word and picture portray-

al of a wide variety of its uses, are contained within the new 16-page color booklet published by Caterpillar Tractor Co., Peoria, Ill.

The publication high lights operations of the manufacturer's products in in all phases of the earthmoving field.

New Stoper

10. A new Blue Brute self-rotating stoper, Model WR-31 announced, by Worthington Pump and Machinery Corporation, Harrison, N. J., is well balanced and easily operated with the holding handle placed above the center of gravity. Four-pawl rifle bar rotation is used with air thrown pawls set in a pawl housing in the cylinder. The rifle

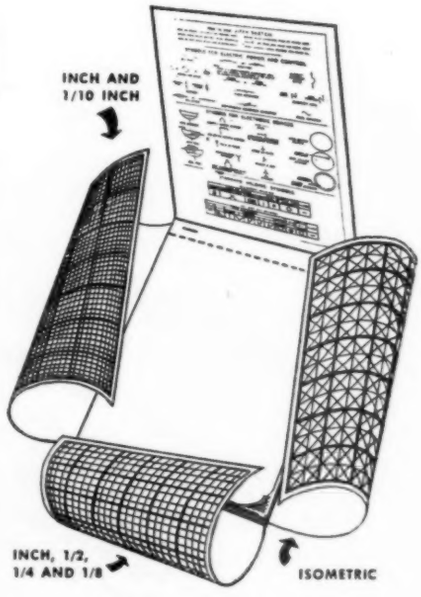


New Blue Brute Stoper-Model WR-31

bar has a ratchet at the lower end which engages the pawls on the back stroke of the piston. This is a new and exclusive Worthington design. A shield type threaded chuck is furnished for all sizes and sections of shankless drill steel and a constant stream of air through the air tube keeps water and sludge out of the front end. The integral cylinder with replaceable bronze liner is stated to insure perfect alignment of the piston and the long cylinder guide gives added rigidity to the front head. The shielded exhaust is directed downward away from the operator. On the feed piston, tapered washers flare the cup leathers out to prevent leakage between feed piston and cylinder. The replaceable tapered feed leg bushing stays tight. The feed piston point is stellited for long life.

New Scale Drawing Pad

11. A scale drawing pad that enables one to make properly proportioned drawings without use of ruler, drafting board or T-square, is being introduced by Jiffy Sales Co., Cleveland, O. The Jiffy sketch pad contains 75 sheets of high quality tracing tissue, enclosed within a cover jacket that consists of four cardboard flaps. Various scales are printed on three of the flaps. To use the pad, you simply fold back the



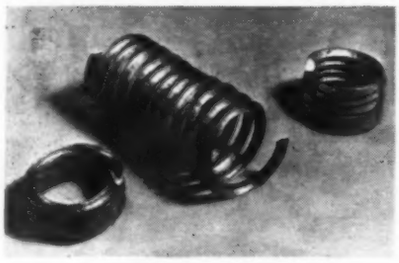
Jiffy Sketch Pad

cover flap and then place one of the tissue sheets over the scale you wish to employ. Your drawing is made accurately to scale with the aid of the printed lines which show through the tissue. Drawings made on this pad may be blue-printed. There are no ruled lines on the tissue to confuse the drawing. The pad measures approximately 9 by 12 in. Sheets are perforated for easy removal. Valuable information is printed on the back of

each cover flap — basic mechanical drafting standards; electrical, welding and architectural symbols; decimals of a foot; decimal equivalents of fractions, with circumferences and areas of circles.

New High Pressure Packing

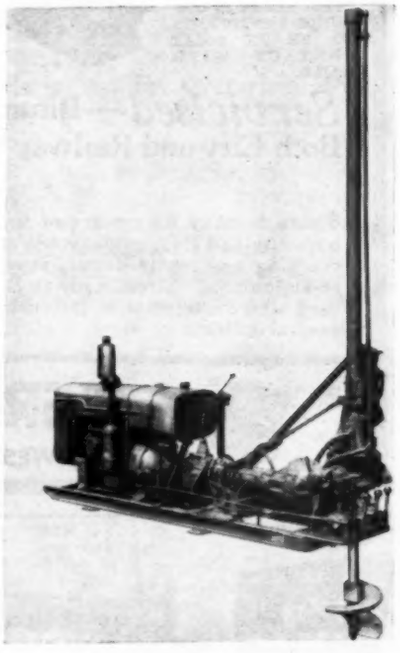
12. A recent addition to the Raybestos-Manhattan (Manheim, Pa.) packing line is a V-shaped packing for steam or air rods, valve stems, boiler feed-plungers, hydraulic rams, etc. It is made from woven asbestos cloth frictioned with high heat resisting compound and molded into a V-shape. The V-shape is stated to insure automatic sealing of high or low pressure, with a minimum of surface friction on the pressure stroke and no friction on the return stroke.



New High Pressure Packing

Earth Boring Machine

13. A hydraulically controlled earth boring machine that provides automatic regulation of cutting speed to meet the texture of the soil is in production by Jaques Power Saw Co., Denison, Tex. The machine is equipped with 110 h.p. industrial type gasoline engine, with starter, generator and battery. The entire unit can easily be attached to or removed from truck or other conveyance. Holes up to and including 24 in. in diameter can be drilled with this machine. (Equipment for larger diameter holes can be obtained on special order, the manufacturers have advised.) Depth of hole is 8 to 9 ft. with standard machine. Total weight of this machine is 3400 lb. It is 4 ft. 3 in. in width and 10 ft. long.



Jaques Earth Boring Machine

New Earth Mover

14. The first "Gradall," the new earth-moving machine of the Warner & Swasey Co., Cleveland, O., has been delivered to Thomas Conte, partner of The Construction Equipment and Supply Co., Pittsburgh, Pa., who will handle the sales in western Pennsylvania and the West Virginia panhandle. The "Gradall," invented by Ray Ferwerda, a Cleveland contractor who has licensed the Warner & Swasey Co. as exclusive builders of the machine, is of all-welded construction and has hydraulic

The First "Gradall." Ray Ferwerda is shown in driver's seat, S. J. Beatty, Jr. in charge of "Gradall" sales is in rotating platform and Thomas Conte is in center.

controls. Its 24 ft. telescoping boom and control cab are mounted on a turntable which has a swing of 360°. The boom is mounted within a double-ring assembly so that the entire boom can be tilted 45° in either direction from the horizontal, raised 22° into the air, or lowered as much as 44°. The unit has a total weight of 16,000 lb., excluding tools, and is mounted on an International Harvester 6-wheel truck chassis. It is powered with an International Harvester U-9 gas engine which operates at 1200 rpm. The unit drives four gear pumps which operate at 1,000 lb. psi. Special attachments for digging, trenching, ditch-cleaning, cleanup, or snow removal and scraping are available; any of these can be interchanged in less than 15 minutes.

New Moisture Meter for Concrete Sand

15. A new type of meter for determination of free-moisture in concrete sand has been developed by J. Thomas Rhamstine, Harlingen, Texas. The new instrument embodies new principles and procedures. The device is electrically operated and has a specially designed "prod" or pick-up which is merely inserted in the sand to obtain

Moisture Meter

a reading. It is a constant operating device, — the prod could be mounted in the batching hopper, the meter needle indicating continously the percent of free moisture. Installation is not involved, the user standardizes his meter for the particular sand he is using, and once set it requires no further calibration for that one specific quality or type of sand.

MANUFACTURERS' LITERATURE

Tractor

16. A 24-page catalog introducing its newly improved HD-10 Diesel tractor has been issued by Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Among the features in this booklet are those about grease-packing and "positive seals", transmission construction, 2 cycle Diesel power, and the new longer track design. An entire page is devoted to standard equipment and auxiliary attachments of the HD-10. A specification sheet offers detailed information.

Graders and Roller

The Galion Iron Works & Mfg. Co., Galion, O. has just issued the following catalogs:

17. Catalog No. 290 on the new Galion 102 heavy-duty motor grader — the largest and most powerful motor grader ever to appear in the Galion line. Twenty-eight pages of descriptive and illustrated matter cover many new and exclusive features.

18. Catalog No. 288 on the new Galion 402 light-duty motor grader. This model is especially designed for economical light construction and ordinary maintenance work. It is a high speed maintainer with full hydraulic control of moldboard and scarifier operations.

19. Catalog No. 295 on the new Galion portable roller. This compact unit is claimed to be most economical for rolling all types of patch material and for use on odd jobs such as compacting surface materials on drives, alleys, parking lots, rolling lawns, etc. This new Galion portable is said to have the compression effectiveness of a conventional 5 to 7 ton tandem roller and with the added advantage of quick and easy towing by a truck from job to job.

Diesel Crawler Tractor

20. A 32-page catalog on its HD-14 Diesel crawler tractor has been released by the Tractor Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Photos of the tractor in action plus cutaway views of important parts are liberally distributed throughout the booklet. Stories on the "pusher" technique, 2-cycle Diesel power, grease-packed truck wheels, 4-way cooling and track design are presented. Special pages are devoted to allied equipment, auxiliary attachments and specifications.

New Accounting System for Contractors

21. A new and simplified system of accounting for contractors has been developed by Tallman, Robins & Co., Chicago, Ill. Outstanding features of the sytem are its use of contracting terms and items; its "Job Memoranda" for recording pertinent information in the figuring of jobs; its presentation of figures and information for figuring all taxes which Contractors must pay; a "Job Record" form which permits a running comparison of "actual" costs with "estimate" costs; and a reliable basis for figuring and including overhead costs. "With the use of this system, it is stated, the contractor can readily total his cost items, add his overhead percentage and be confident that what he adds for profit, will be profit. The system is for both large and small operators and carries complete instructions for use, along with a contractor's tax calendar. It may be used as either a single or double entry system.

Rock Crusher

22. Its new Kue-Ken simplex high speed crusher is illustrated and described in a bulletin of Straub Manufacturing Co., Inc., Oakland, Calif. This crusher operates on the Kue-Ken principle of crushing without rubbing. The crusher is of all-steel construction and all working parts are enclosed in a sealed housing. A pressure switch in the oil system provides protection against lubrication failure. In the hub of the driving pulley, there is an overload safety device, without any bending, breaking or shearing parts, to provide instant relief against tramp iron or severe overloads.

New Literature Available

23. Copy of a new Rod Selector Chart has just been received from the Eutectic Welding Alloys Corporation. This chart,* in addition to listing the company's products and their suggested applications, contains factual information which will be appreciated by all those doing welding. The bonding and remelting temperature is given for each alloy as well as the Brinell hardness. Another column features the strength in psi. of these "low temperature" welding alloys.

*Interested readers may secure copies of this 18 x 23 in. chart on request from Eutectic Welding Alloys Corporation, 40 Worth Street, New York 13, New York.

Mortar and Plaster Mixer

24. The 1947 Rex mortar and plaster mixer is described in a bulletin being distributed by Chain Belt Co., Milwaukee, Wis. The new bulletin contains close-up illustrations of features of the mixer, such as the adjustable scrapers and structural steel blades; the sealed bearings; the two position telescopic tow pole, adjustable for either truck or car hitch; the 4 h.p. air cooled engine. Job pictures are also shown, and a table of specifications is included.

Metal Screens

25. A new edition of Morrow handbook of perforated metal screens for sizing and grading sand, gravel, stone, coal and other bulk material has been published by Morrow Manufacturing Co., a subsidiary of McNally Pittsburg Mfg. Corp., Pittsburg, Kans. It contains illustrations, data tables, specifications and standard practice information on three types of perforated plate screens — flat, step, conical and cylindrical.

Cost Keeping System for Trucks

26. A complete set of sample forms required to set up a simplified system of keeping operating cost records has been made available to truck owners by the Four Wheel Drive Auto Co., Clintonville, Wis. The system was developed by the FWD Service Department during over 35 years of truck manufacture. Only four forms are used: the driver's daily report, repair labor slips, monthly report and yearly report. The first form to be filled out is the driver's daily report. These reports are bound in a handy 4½ x 8 in. book which the driver keeps in his possession. At the end of each working day, he fills out and turns in his daily cost report. The driver's daily report is a running account of the truck's performance and forms the basis for the monthly and annual operating cost report. Each day the information on the driver's daily report is transferred to the monthly report record of one truck. When there is a repair labor slip turned in, that information also is entered on this form. At the end of each month the items are totaled and entered on the yearly report. The annual report lists each month's operation separately and can be used as basis for comparison.

Pavement Marker

27. A self-propelled marker, claimed to have a capacity of 10,000 ft. of striping per hour is illustrated and described in literature of Meili-Blumberg Corp., Box RS-5, New Holstein, Wis. The marker operates at a constant speed producing a uniform line and increasing lineage per gallon of material used. It handles any type of striping job-traffic lines, straight or curved, single or double-parking areas, safety zones, cross-walks, etc.

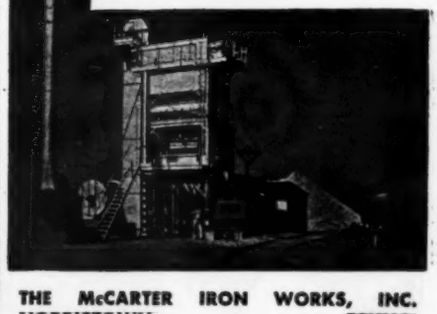
WITH THE MANUFACTURERS & DISTRIBUTORS

New Steel Institute Office

The American Institute of Steel Construction has opened a district office at 1617 Pennsylvania Boulevard, Room 542, Philadelphia 3, Penna. Phone, Rittenhouse 0880. Henry J. Stetina is district engineer.

New Distributor

The Power Equipment Co., has been organized with offices at 1358 Island Home Ave., Knoxville, Tenn., and will engage in the sale and service of construction and industrial equipment. R. S. Tucker is president, R. O. Wright, Vicepresident and Morgan B. Ayres, Secretary-Treasurer.



Marion Announces Plant Modernization

A modern transportation system has just been inaugurated by Marion Power Shovel Company as part of its plant rehabilitation and modernization program, Mr. M. E. Montrose, Company President, announced today.

The new system was made possible by the construction of nearly two miles of paved roadway to connect the various plant buildings, and the purchase of a fleet of trucks, a jeep, trailers and fork lift trucks.

It is the first time in the Company's history that automotive type transportation facilities have been provided for the factory. In the past, only company owned railroad and overhead crane facilities were used.

The company's new trucks, jeep and trailers will be used to speed the flow of materials and parts from one department to another, and other transportation functions. Fork lift trucks speed the movement of parts along the production lines within the buildings where aisles have been arranged for this purpose. Every building and storage area on the Marion Power Shovel Company grounds can now be reached by trucks and jeep-pulled trailers. The system was installed under the direction of Mr. J. M. Demarest, Vice President and Works Manager, as part of the plant-wide program of rehabilitation and modernization.

New Branch Manager For Mack

John W. Adelung, formerly New York and New England Regional Director, Office of Defense Transportation, has been appointed district manager of Mack's White Plains, N. Y., branch. Mr. Adelung resumes his lifetime business career in transportation after having served the ODT successively as chief examiner, New York City; district manager, New Haven, Conn.; and Regional Director. As freight representative in New York City for the Pennsylvania RR, Mr. Adelung entered the transportation field in 1924. From 1930 until the war's beginning he was employed as vice president, Interstate Traffic Audits Bureau; and Traffic Manager, Glen Cove Motor Express, Inc., and Sidney F. Schupper Motor Lines, Inc., all of New York City.

New Executive Appointments for Koppers

Among the new executive appointments announced by General Brehon Somervell, President of Koppers Co., Inc., were those of Vice President J. N. Forker as general manager of the new Tar Products Division, and Vice President Dan M. Rugg as general manager of the new Chemical Division, both with offices in Pittsburgh. Mr. Forker was general manager of the former Tar and Chemical Division, and Mr. Rugg was manager of the former Butadiene Division. Other appointments include those of Vice President W. Reed Morris as general manager of the new Gas and Coke Division with headquarters at Kearny, N. J., Vice President J. F. Byrne on special assignment for the Engineering and Construction Division, and Vice President M. T. Herreid as manager of Kopper Plants at Granite City, Ill., and St. Paul, Minn. Appointment of George M. Walker as Manager of the new Control Section, attached to the president's office, also has been announced. Included in the list of new appointments is that of J. C. Macon, Jr., as general sales manager of the Tar Sales Department. His office is in Pittsburgh and he has charge of sales of tar products and coated products. Appointment of T. C. Keeling as sales manager of the new Chemical Division also has been announced.

Beatty to Handle Gradall Sales

D. M. Pattison, general sales manager of The Warner & Swasey Co., Cleveland, O., has announced the appointment of S. J. Beatty, Jr., as assistant sales manager in charge of the Gradall Division. This division will be responsible for the distribution of the new Warner & Swasey, multi-purpose earth mover, which will be handled entirely through construction equipment distributors.

Personnel Changes for LeTourneau

R. G. LeTourneau, Inc., Peoria, Ill., has announced several important personnel changes in its General Sales Division. Included are changes in the Sales, Service and Market Research Departments. Wendell Richards, District Sales Representative in Pittsburgh, Philadelphia and Baltimore, has been promoted to the post of market research manager, a position vacant for the past few months. He has been

O. A. Williams

W. Richards

with LeTourneau since 1935. Cloyd Richards, Assistant Service Manager, has been named general service manager to succeed C. F. Zimmerman, who recently transferred to the sales field. Richards joined LeTourneau in 1937. O. A. "Jack" Williams has been appointed eastern sales manager to succeed Harry Conn, resigned. Williams has been district sales representative in Ohio, Indiana and Michigan, for the past 3 years. Replacing Williams is C. F. Zimmerman, former general service manager, who has been with the firm since 1937. Also announced was the appointment of Harold R. McQuarrie, eastern credit manager, to the newly-created post of assistant to the domestic sales manager.

New FWD Distributors

The United Equipment Associates, 195 West Seventh Ave., South Williamsport, Pa., has become associated with The Four Wheel Drive Auto Co. as FWD distributor in the counties of Tioa, Lycoming, Union, Snyder, Montour and Northumberland in Pennsylvania. American Air Compressor Corporation, 48th St. and Dell Ave., North Bergen, N. J., has been appointed FWD distributor in the state of New Jersey. Norman Joyce Kilmer, 494 Frick Bldg., Pa., has been appointed FWD distributor for the city of Pittsburgh and Allegheny County.

New Vice-Presidents for Richkraft

The Richkraft Co., Chicago, Ill., has announced the appointment of Merle L. Cripe and C. A. Cook as vice-presidents, effective August 1, 1946. Mr. Cripe assumes charge of the research department. Mr. Cook, in addition to his new duties as vice-president, continues as western sales manager in charge of the Richkraft offices in Oakland, Calif.

Cummins Appointments

Leonard W. Beck has been appointed acting general sales manager of the Cummins Engine Co., Inc. His new responsibilities will be the overall administration of the Distribution Division (Sales and Service). While Mr. Beck also will continue as manager of the company's Central Region, his offices will be at the factory in Columbus, Ind. Mr. Beck has been with the Cummins Diesel organization since 1938. Byron A. Duling, Manager of the Cummins Engine Co. Cleveland Region, has been assigned to the home

office to work directly under Mr. Beck. Corwin B. Briscoe has been appointed acting parts merchandising manager at Columbus. Other appointments are Norman E. Palmer as the Cummins representative in Washington, D. C., and Fred W. Sparks as Manager of the Cleveland Region. James D. Allen continues as sales manager of Dealer Operations at Columbus, and Kenneth M. Leech as service manager at Columbus.

Lidgerwood Reorganizing Manufacturing Facilities

Lidgerwood Manufacturing Co., a leading producer of hoisting, conveying and marine auxiliary machinery, is reorganizing its manufacturing facilities, concentrating its heavy manufacturing and its medium and light lines in its other plants, principally those located at Superior, Wis., and Beacon, N. Y. To effect the new policy the company has sold its real estate in Elizabeth, N. J. Machinery, equipment and necessary executive, administrative and engineering personnel will be transferred to the appropriate units. The program, the company announced, will result in increased efficiency and economy of operation and will afford more suitably located shipping points for the convenience of its customers. Facilities at the Superior and Beacon plants will be enlarged to incorporate the production formerly turned out at the Elizabeth plant and also new products the company has developed. Under the name of Superior-Lidgerwood-Mundy Corporation, 206 years of accumulated experience in the technique of designing and manufacturing hoists, conveying devices and marine equipment will be consolidated into a large, economical and more efficient unit. On Oct. 1st the Lidgerwood Manufacturing Co. established their executive offices at 7 Dey St., New York 7, N. Y.

New Distributor for Insley

J. T. Conners, Cleveland, O., has been appointed northern Ohio distributor for the line of excavators and material handling equipment of Insley Manufacturing Corp., Indianapolis, Ind. Mr. Conners has formed the Conners Equipment Co. with an office in the Leader Building, Cleveland. His contract is for 31 northern Ohio counties. Mr. Conners has been selling shovels in midwestern and western states for the last 20 years. He was manager of the Coastal Equipment Co. during the last five years. The Car Equipment Co., 232 S. 18th St., Columbus, will continue to distribute Insley excavators and concrete handling machinery in central and southern Ohio.

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Immediate Delivery From Available Stocks . . . At A Savings!

NEW ROCK-BITS
INGERSOLL-RAND
JACK-BITS
All Sizes! All Types!

DRILL STEELS
For Ingersoll-Rand Jack-Bits
All Sizes, Types and Lengths!

NEW
BUCYRUS-ERIR
PARTS
Parts For: 15B, 20B, 22B, 33B, 37B, 54B and 120B.

New, All-Steel, Stiff-Leg
DERRICKS
7 AVAILABLE!
30 Ton at 38 Ft. Radius; 60 Ft. Boom with Bull Wheel.

LeTOURNEAU CRANE
MODEL AD3
Mounted on 4 Pneum. Tires; 20,000 Lbs. capacity at 10 Ft. Radius; 30 Ft. Boom

Furnival Machinery Company

Lancaster Ave. and 54th Street
Phila. 31, Pa. Trinity 7-5200

FOR SALE
CLIMAX GASOLINE ENGINES

NEW — model V-425, 12 cylinder 425 H.P. at 1200 RPM, gasoline engine power unit complete radiator to twin disc clutch inclusive with gasoline starting engine. Cheaply convertible to natural gas operation. Priced far below factory list, 7 units available. Dealers invited.

THE FINN EQUIPMENT COMPANY
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Cincinnati 8, Ohio
Phone East 1125

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(GAS ENGINE DRIVEN)
AURORA PUMP
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4" Suction & Discharge 480 G.P.M. at 300 Ft. Head Pressure. Completely Assembled; Skid Mounted. Spare parts, tools and accessories with each pump.

$585 FOB, Phila., Pa.

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Irrigation, Water Supply, Fire Fighting, Jetting, Drainage.

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CRATED FOR EXPORT

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Sale or Rent

Headquarters for REPAIRS—any make. Factory service. We will also *buy* your old instruments or take them in *trade*.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-10.

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Manufacturers of Sterling Transits and Levels
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See Page 113
for hard-to-find
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- **CONTRACTORS**
- **ROADBUILDERS**
- **EXCAVATORS**

Ten Used
STUDEBAKERS
Two to Three Ton Cab Forward Trucks equipped with Dempster-Dumpster Hoisting Units and several extra buckets

Approved OPA ceiling price $2265 per unit F.O.B. New York.

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All equipment listed is owned by us, and has been overhauled in our daylite shop by experienced mechanics.

PAVING EQUIPMENT
Ransome Paver, Dual-Drum Buckeye Finegraders. For ½ and full width pavement
Jaeger Spreaders
Jaeger Finishers. Model H, full and ½ width pavement
Blaw-Knox Finishers. ½ width pavement

BUCKETS
Owen & Blaw-Knox. 1¼, 1½, 2½, and 3 yd. rehandling.

FORMGRADERS
Cleveland "Carr". With Waukesha Motors.

FORM TAMPERS
Jaeger (new).

PULVI-MIXERS
Seaman. With power.

ROOTERS
Isaacson & Davenport. Various Sizes.

BOEHCK EQUIPMENT COMPANY
2404 West Clybourn Street
MILWAUKEE 3, WISCONSIN

Rent or Sale

BUFFALO-SPRINGFIELD 5-8 ton Tandem Roller. Latest model US-21. Like new. $2750.00
DEMPSTER-DUMPSTER & BROOKS LOAD LUGGERS. Latest models LF-200 with buckets. Just the thing for pavement repairs. $600.00 per set
IOWA Portable Crushing outfit, 12" x 20" r.b., v-belt to 60 H.P. Climax, folding type elevator. Rebuilt. Guaranteed. $2750.00
AUSTIN-WESTERN 10" x 40" r.b. Jaw Crusher, mounted on truck. A-1. $2000
SCHRAMM 210 cu. ft. latest model Portable Compressor. First class. $1750.00
INGERSOLL-RAND X-71 Wagon Drill, D-2 mounting for 10 ft. changes. Pneumatic Hoist. Guaranteed like new. $800.00
WOOLRIDGE BB-S. 11 cu. yd. cable Scraper. New. $3800.00
LeTourneau D. 4-5 cu. yd. cable Scraper. New. $2000.00
BUCKEYE ¾ yd. shovel-dragline. Like new. Rent only.
NORTHWEST NO. 6 dragline, 60 ft. boom. Good. $11,000.00
LE TOURNEAU 2-drum Hoist for D-7. New. $750.00
WOOLRIDGE WE-2 2 drum power unit for TD-18. New. $900.00
LA PLANTE CHOATE Cable Dozer complete with power unit and accessories, fit late D-7. New. $1000.00
BUCKEYE Cable Dozer, BBD- for wide HD-7. New. $800.00
M. Wenzel, 2136 Jefferson St., Kansas City, Mo.

FOR SALE

1—54" x 24 ft. Rotary Dryer
1—3' x 8' Seco Vibrator Screen
1—4' x 9' Seco Vibrator Screen
Good condition — Immediate Delivery.
H. J. Hagen **Globe, Arizona**

Inquiry Blank and Advertisers' Index

Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

Check below advertisements on which you wish information on products featured:

*Advertisers with * are represented in the 1946 edition of Powers Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.

Check other products below on which you wish us to obtain information for you:

AGGREGATE:
- ☐ Bins and Hoppers
- ☐ Conveyors
- ☐ Crushers
- ☐ Portable Plants
- ☐ Screens

BITUMINOUS:
- ☐ Batchers
- ☐ Finishers
- ☐ Distributors
- ☐ Dryers
- ☐ Heaters
- ☐ Plants (central)
- ☐ Plants (travel)

CONCRETE:
- ☐ Batchers
- ☐ Buggies and Carts
- ☐ Finishers
- ☐ Joints, Expansion and Contraction
- ☐ Reinforcement Accessories
- ☐ Metal Road Accessories
- ☐ Mixers (under 1 yd.)
- ☐ Mixers (1 yd. up)
- ☐ Pavers
- ☐ Reinforcing Steel
- ☐ Road Forms (1000' set)
- ☐ Tower
- ☐ Truck Mixers

CRANES
- ☐ Crawler Mounted
- ☐ Truck Mounted
- ☐ Piledrivers

GRADERS:
- ☐ Blade, self propelled
- ☐ Blade, pull type
- ☐ Blade, under truck
- ☐ Elevating

LOADERS & TRENCHERS:
- ☐ Front-end loader (tractor mounted)
- ☐ Loader, bucket type and belt type
- ☐ Trencher or Ditcher

HAULING EQUIPMENT:
- ☐ Dump Trucks, self-powered
- ☐ Dump Wagons, tractor drawn
- ☐ Flatbed Trailers
- ☐ Other Trucks

PUMPS:
- ☐ Centrifugal
- ☐ Concrete
- ☐ Diaphragm
- ☐ Mud Jacking
- ☐ Piston
- ☐ Wellpoint

POWER UNIT: (Independent)
- ☐ Gasoline
- ☐ Diesel
- ☐ Electric

ROLLERS:
- ☐ Power (Smooth)
- ☐ Pneumatic Tire
- ☐ Sheepsfoot

TRACTORS:
- ☐ Crawler
- ☐ Rubber-Tired

TRACTOR EQUIPMENT:
- ☐ Dozers
- ☐ Power Control Units
- ☐ Rippers
- ☐ Scrapers, tractor drawn
- ☐ Scrapers, self-powered

BUCKETS:
- ☐ Clamshell
- ☐ Concrete
- ☐ Dragline
- ☐ Orange Peel

SHOVELS & DRAGLINES:
- ☐ Crawler (under 1 yd.)
- ☐ Crawler (1 yd. up)
- ☐ Truck Mounted

ROCK DRILLS & AIR TOOLS:
- ☐ Air Compressors
- ☐ Backfill Tampers
- ☐ Clay Diggers
- ☐ Concrete Vibrators
- ☐ Drills, cable tool
- ☐ Drills, tripod and wagon
- ☐ Drills, rock, hand-held
- ☐ Paint Sprayers
- ☐ Paving Breakers
- ☐ Riveters and Chippers

MISCELLANEOUS:
- ☐ Buildings, portable
- ☐ Earth Drills, power
- ☐ Light Plants
- ☐ Lubrication, Service Truck
- ☐ Mowers, Highway
- ☐ Power Saws
- ☐ Soil Stabilizing Equipment
- ☐ Snowplows, rotary
- ☐ Snowplows, v or wing
- ☐ Spreaders, sand or cinders
- ☐ Street Flushers
- ☐ Street Sweepers
- ☐ Welders
- ☐ Cutting Torches
- ☐ Hydraulic Jacks
- ☐ Hydraulic Control Equipment
- ☐ Hand Tools
- ☐ Hoists, derrick type

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Your Name ..... Title or profession .....

Name of your company or governmental department .....

Type of work for which equipment will be used .....

Street Address .....

City ..... State ..... County .....

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Tech.

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your Equipment against RUST

SIMPLY brush *Texaco Rustproof Compound* over exposed metal surfaces. The resulting soft, self-healing, *waterproof* film will give effective protection — usually for a year, at least. *Texaco Rustproof Compound* also removes easily, and is distinctly economical. The cost of Texaco rustproofing every piece of equipment in your yard is far less than the cost of the damage rust may cause to just one machine.

Texaco Rustproof Compound fights rust three ways. It 1) prevents rust from forming; 2) penetrates existing rust and stops further rusting; and 3) loosens existing rust, makes it easy to remove.

Use *Texaco Rustproof Compound* on all metal construction equipment, and on gas holders, water works, sewage disposal plants, bridges — wherever metal is exposed to weather or corrosive chemicals and fumes.

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TEXACO

TEXACO Rustproof Compound

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS